Meadow Ridge Timber Sale
Environmental Assessment

Kalispell Unit
Northwest Land Office
Montana Department of Natural Resources and Conservation
September 2016

Meadow Ridge Timber Sale

Environmental Assessment

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Environmental Assessment

Project Name: Meadow Ridge
Proposed Implementation Date: July, 2017
Proponent: Kalispell Unit, Northwest Land Office, Montana DNRC
County: Lincoln

Type and Purpose of Action

Description of Proposed Action:

The Kalispell Unit of the Montana Department of Natural Resources and Conservation (DNRC) is proposing the Meadow Ridge Timber Sale. The project is located approximately 35 air miles west of Kalispell, MT. (refer to Attachments vicinity map A-**1** and project map A-**2**) and includes the following sections:

Beneficiary	Legal Description	Total Acres	Treated Acres
Common Schools	**S. 4 T27N R27W** **S. 36 T28N R27.5W**	**80** **640**	**80** **350**

Objectives of the project include:

In alignment with the management philosophy of the State Forest Land Management Plan (SFLMP) and in compliance with the Forest Management Rules and Habitat Conservation Plan (HCP) commitments, DNRC has set the following specific project objectives:

- Harvest approximately 2.5 MMBF of merchantable timber to generate revenue for the Common Schools trust and to contribute to the sustainable yield for the DNRC timber management program, as mandated by *State Statute 77-5-222 MCA.*
- Promote biodiversity by managing for appropriate stand structures and species compositions.
- Improve the growth and vigor through silvicultural treatments that increase stand vigor and reduce the amount of insect and disease infected trees.
- Maintain Old-Growth stands by retaining the appropriate number of large diameter tree species.

Proposed activities include:

Action	Quantity
Proposed Harvest Activities	# Acres
Seed Tree	268
Old Growth Restoration	162

Action	Quantity
Total Treatment Acres	**430**
Proposed Forest Improvement Treatment	# Acres
Pre-commercial Thinning	
Planting	
Pile and Scarify	**268**
Proposed Road Activities	# Miles
New permanent road construction	0
New temporary road construction	.35
Road maintenance (level. 1, 2)	12.55
Road reconstruction (level 3)	2.8
Road abandoned	0
Road reclaimed	0
Total Miles Roadwork	15.7

Duration of Activities:	3 years
Implementation Period:	July 2017 –September 2020

The lands involved in this proposed project are held in trust by the State of Montana. (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and the DNRC are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for the beneficiary institutions (Section 77-1-202, MCA).

The DNRC would manage lands involved in this project in accordance with:

- The State Forest Land Management Plan (DNRC 1996),
- Administrative Rules for Forest Management (ARM 36.11.401 through 471),
- The Montana DNRC Forested State Trust Lands Habitat Conservation Plan (HCP) (DNRC 2010)
- All other applicable state and federal laws.

Project Development

SCOPING:

- DATE:
  - September 2014
- PUBLIC SCOPED:
  - The scoping notice was posted on the DNRC Website: http://dnrc.mt.gov/public-interest/public-notices
  - Adjacent landowners, statewide scoping list, Kalispell *Daily Inter Lake*, user groups
- AGENCIES SCOPED:
  - MT DEQ, USFWS, MT FWP
- COMMENTS RECEIVED:
  - None

Internal and external issues and concerns were incorporated into project planning and design and would be implemented in associated contracts.

INTERDISCIPLINARY TEAM (ID):

- Project Leader: Pete Seigmund
- Archeologist: Patrick Rennie
- Wildlife Biologist: Leah Breidinger
- Hydrologist: Tony Nelson
- Silviculturist: Tim Spoelma

OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:

- **United States Fish & Wildlife Service-** DNRC is managing the habitats of threatened and endangered species on this project by implementing the Montana DNRC Forested Trust Lands Habitat Conservation Plan (HCP) and the associated Incidental Take Permit that was issued by the United States Fish & Wildlife Service (USFWS) in February of 2012 under Section 10 of the Endangered Species Act. The HCP identifies specific conservation strategies for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout. This project complies with the HCP. The HCP can be found at http://dnrc.mt.gov/divisions/trust/forest-management/hcp

- **Montana Department of Environmental Quality (DEQ)-** DNRC is classified as a major open burner by DEQ and is issued a permit from DEQ to conduct burning activities on state lands managed by DNRC. As a major open-burning permit holder, DNRC agrees to comply with the limitations and conditions of the permit.

- **Montana/Idaho Airshed Group-** DNRC is a member of the Montana/Idaho Airshed Group which was formed to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction (Montana/Idaho Airshed Group 2006). The Group determines the delineation of airsheds and impact zones throughout Idaho and Montana. Airsheds describe those geographical areas that have similar atmospheric conditions, while impact zones describe any area in Montana or Idaho that the Group deems smoke sensitive and/or having an existing air quality problem (Montana/Idaho Airshed Group 2006). As a member of the Airshed Group, DNRC agrees to burn only on days approved for good smoke dispersion as determined by the Smoke Management Unit.

ALTERNATIVES CONSIDERED:

No-Action Alternative

No timber harvesting would occur. Small quantities of wood products would continue to be sold from some areas in the form of residential firewood and other types of permits.

Forest and plant succession would continue to be mainly influenced by the occurrence of natural events, such as insect and disease outbreaks, wind throw, or wildfire.

No road maintenance or road improvements would occur. Maintenance of existing roads would be limited to periods when the roads are being used for removal of forest products.

Action Alternative

Under the Action Alternative, DNRC would harvest approximately 2.5 million board feet from approximately 430 acres. An old growth maintenance cut would be applied to approximately 162 acres. The remaining area would be treated with seed tree (357 acres) prescriptions to promote the regeneration of western larch and ponderosa pine. Forest health and vigor would be improved in all treated acres. The various treatments are explained under the Silvicultural Treatment section below and summarized in Figure 2-1.

Timber would be harvested using tractor logging with conventional, mechanical, or cut-to-length operations and skyline yarding. The transportation plan would utilize 15.2 miles of existing road and 0.35 miles of temporary road construction.

Issues surrounding this proposed action have either been resolved or mitigated through project design or would be included as specific contractual requirements of this project.

Impacts on the Physical Environment

VEGETATION:

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to vegetation:

- Timber harvesting and associated activities may affect stand characteristics including species composition, stand age, and succession.
- Timber harvesting and associated activities may affect stand structure and development.
- Overstocked stand conditions are contributing to loss of timber productivity and may increase risk of mortality from insect and disease.
- Timber harvesting and associated activities may affect the distribution and amount of old growth stands.
- Forest management activities could increase prevalence of noxious weeds in the project area.

Recommended Mitigation Measures for Vegetation- The analysis and levels of effects to vegetation resources are based on implementation of the following mitigation measures:

- Reduce stand densities to increase tree growth and vigor and improve forest health.
- Retain the appropriate numbers of large diameter trees per acre so stands would continue to meet Green et al. old growth definition.

- Design harvest activities to promote desired future conditions across all stands.
- Use integrated pest management to reduce risk of noxious weed spread.

FOR COMPLETE VEGETATION ANALYSIS SEE ATTACHMENT B.

SOILS:

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to soils:

- The use of logging equipment could result in soil compaction
- The combined effect of historical logging and the proposed project could increase the severity of soil compaction issues.
- Displacement of topsoil could reduce the opportunity for vegetative growth.
- Woody debris volumes could be negatively affected by timber management.

Recommended Mitigation Measures for Soils- The analysis and levels of effects to soils resources are based on implementation of the following mitigation measures.

- Limit equipment operations to periods when soils are dry (less than 20% oven-dried weight), frozen or snow-covered in order to minimize soil compaction and rutting, and to maintain drainage features. Check soil moisture conditions prior to equipment start-up.
- On ground-based units, the logger and sale administrator would agree to a skidding plan prior to equipment operations. Skid trail planning would identify which existing trails to use and how many additional trails are needed.
- Do not use existing trails if they are located in draw bottoms or other unfavorable locations.
- Grass seeding or other erosion control measures may be required to stabilize some trails.
- Limit ground-based operations to slopes less than 40% unless they can be used without causing excessive displacement or erosion.
- Space cable yarding corridors at least 75 feet apart. Clearing width for corridors to accommodate yarding should not exceed 12 feet.
- Keep skid trails to 20 percent or less of the harvest unit acreage. Provide for surface drainage of all roads and skid trails concurrent with operations.
- Slash disposal: Limit the total of disturbance and scarification to 30-40 percent of harvest units.
- Limit dozer piling to slopes less than 35 percent and limit excavator piling to slopes less than 40 percent unless it can be completed without causing excessive erosion.
- Retain between 15 and 20 tons/acre of woody debris 3-inches in diameter or greater (depending on habitat type) and a feasible majority of fine branches and needles following harvesting operations. On units where whole-tree harvesting is used, implement one of the following mitigations for nutrient cycling: 1) use in-woods processing equipment that leaves fine slash on site; 2) for whole-tree harvesting, return skid slash and evenly distribute within the harvest area; or 3) cut tops from every third bundle of logs so that tops are dispersed as skidding progresses.

FOR COMPLETE SOILS ANALYSIS SEE ATTACHMENT C.

WATER RESOURCES:

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to water resources:

- Logging and related forest management activities can result in sediment delivery and subsequent water quality issues.
- Water yield can be affected by timber harvesting and associated activities.

Recommended Mitigation Measures for Water Resources- The analysis and levels of effects to water resources are based on implementation of the following mitigation measures.

- Implement Riparian Management Zones on all class 1 streams based on site-potential tree heights in the project area.
- Implement BMPs on all newly constructed roads and improve BMPs on existing roads where needed.
- Use spot-blading on existing roads to preserve as much of the existing vegetative cover as possible on vegetated road surfaces.

FOR COMPLETE WATER RESOURCES ANALYSIS SEE ATTACHMENT D.

FISHERIES RESOURCES *(including unique, federally listed as threatened or endangered, sensitive, and/or species of special concern):*

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to fisheries resources:

- Forest management and related activities could negatively impact native fish present in the Pleasant Valley Fisher River.
- Forest management and related activities could alter channel formations and stream temperature in the project area.
- Road crossings of streams in the project area could contribute large amounts of sediment to the watershed.
- Logging and related activities could affect flow regime in the project area watershed.

Recommended Mitigation Measures for Fisheries Resources- The analysis and levels of effects to fisheries resources are based on implementation of the following mitigation measures.

- Applying all applicable Forestry BMPs (including the SMZ Law and Rules) and Forest Management Administrative Rules for fisheries, soils, and wetland riparian management zones (ARMs 36.11.425 and 36.11.426)

FOR COMPLETE FISHERIES RESOURCE ANALYSIS SEE ATTACHMENT E.

WILDLIFE *(terrestrial & avian including unique, federally listed as threatened or endangered, sensitive, and/or species of special concern):*

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to wildlife:

- Mature forest cover and connectivity. The proposed activities could decrease mature forested cover, which could reduce habitat connectivity and suitability for wildlife species associated with mature forests.
- Old-growth forests. The proposed activities could affect wildlife species associated with old-growth forests by reducing habitat availability and increasing fragmentation.
- Canada lynx. The proposed activities could reduce landscape connectivity and the availability of suitable Canada lynx habitat, reducing the capacity of the area to support Canada lynx.
- Fishers. The proposed activities could reduce the availability and connectivity of suitable fisher habitat and increase human access, which could reduce fisher habitat suitability and increase trapping mortality.
- Flammulated owls. The proposed activities could alter the structure of flammulated owl preferred habitat, which could reduce habitat suitability for flammulated owls.
- Pileated woodpeckers. The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for pileated woodpeckers.

Recommended Mitigation Measures for Wildlife- The analysis and levels of effects to wildlife are based on implementation of the following mitigation measures.

- If a threatened or endangered species is encountered, consult a DNRC biologist immediately. Similarly, if undocumented nesting raptors or wolf dens are encountered within ½ mile of the Project Area contact a DNRC biologist.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per *ARM 36.11.444(2)* and *GB-PR2* (*USFWS and DNRC 2010)*.
- Contractors would adhere to food storage and sanitation requirements as described in the timber sale contract. Ensure that all attractants such as food, garbage, and petroleum products are stored in a bear-resistant manner.
- Restrict public access at all times on restricted roads that are opened for harvesting activities. Effectively close all restricted roads following harvest completion.
- In EA Units 2, 4, and 5 retain patches of advanced regeneration of shade-tolerant trees as per *LY-HB4* (*USFWS and DNRC 2010*).
- To protect nesting northern goshawks, prohibit hauling and logging within ¼ mile of the nest from April 1-June 30. From July 1- August 15, prohibit logging within ¼ mile of the nest and permit log hauling for a restricted time period during the morning. Timing restrictions may be lifted if the territory is unoccupied.
- Retain 90 ft^2 basal area near the goshawk nest and retain all trees within 50 feet of the nest.
- Retain visual screening along roads where possible to increase security for wildlife.
- Retain at least 2 snags and 2 snag recruits per acre that are ≥ 21 inches diameter or the next largest available size class, favoring western larch, ponderosa pine, and Douglas-fir for retention. If snags are cut for safety concerns, they must be left in the harvest unit.

- Retain 15-20 tons/acre of coarse-woody debris. Retain coarse-woody debris according to *ARM 36.11.414* and emphasize retention of 15-inch diameter downed logs aiming for at least one 20 foot long section per acre.

FOR COMPLETE WILDLIFE ANALYSIS SEE ATTACHMENT F.

AESTHETICS

Any change to the scenery in the area from these alternatives would be in addition to past activity within the project area. This analysis includes all past and present effects.

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to aesthetics:

- Timber harvesting and associated activities may affect the aesthetic value of the project area. Roads, skid trails, and canopy openings may appear unnatural. Residual logging slash, damaged trees, stumps and uniform tree spacing may detract from the natural appearance associated with an unmanaged forest.

Recommended Mitigation Measures for Aesthetics- The analysis and levels of effects to aesthetics are based on implementation of the following mitigation measures.

- Timber harvest and road building would minimize effects of soil erosion by meeting best management practices. Disturbed areas associated with road building would be promptly revegetated.
- Prescriptions would attempt to mimic natural patterns that would result from fire or other natural forest altering events.
- Reserve patches and uneven tree spacing would reduce unnatural appearance on the project area.

Existing Conditions

The project area is currently a mosaic of forest patches that have resulted from natural events and conditions, previous harvest, and fire suppression activities.

Environmental Effects

Forest management activities would change the current visual appearance of this section. However, due to the absence of recreational improvements and remote location of the site, these changes would likely only affect a small number of people who drive through the area.

-VISUAL QUALITY

No-Action Alternative

The no-action alternative would not have any direct or secondary effects on the visual quality of the stand. However, a cumulative effect from the combination of fire suppression and lack of forest management activities could occur. The stand is currently overcrowded with large areas being slowly converted to shade-tolerant tree dominated forest. Under this alternative it is likely that overcrowding and regeneration of shade tolerant species would continue. This would likely lead to a more Douglas-fir dominated stand that would replace Ponderosa Pine acreage on the Kalispell unit.

Action Alternative

Direct, Secondary, and Cumulative Effects
The action alternative would have direct, secondary and cumulative effects to visual quality in the stand. These effects would include temporary dust generation, reduced tree density, and openings in the canopy where timber would be removed and overcrowding would be reduced. The cumulative effect on the stand would be to promote natural regeneration and forest succession would be pushed towards a more historic condition across the project area.

Through the proposed sale area, slash from the harvest would be noticeable yet temporary. Generally slash disappears from the site within five years, and is often covered by other vegetation within three years.

-NOISE

No-Action Alternative

The no-action alternative would have no effect on noise in the project area.

Action Alternative:

Direct, Secondary, and Cumulative Effects
Harvest activities would be quite audible, and, depending upon air conditions, equipment could be heard many miles from their location. Noise would be generated by harvest operations, harvest related traffic, road construction, and administrative oversight. This could be expected to be present for the entire season of harvest, typically from mid-June through mid-March of the following year, for the duration of the harvest of two to three years during the general "work week".

Based on the anticipated operating periods and the short duration of the timber sale direct, secondary, and cumulative effects of noise would be low.

HISTORICAL AND ARCHEOLOGICAL SITES

Scoping letters were sent to those Tribes that requested to be notified of DNRC timber sales. No response was returned that identified a specific cultural resource issue. A Class I (literature review) level review was conducted by the DNRC staff archaeologist for the area of potential effect (APE). This entailed inspection of project maps, DNRC's sites/site leads database, land use records, General Land Office Survey Plats, and control cards. The Class I search results revealed that no cultural or paleontological resources have been identified in the APE, but it should be noted that Class III level inventory work has not been conducted there to date.

Because the topographic setting and geology suggest a low likelihood of the presence of cultural or paleontological resources, proposed timber harvest activities are expected to have *No Effect* to *Antiquities*. No additional archaeological investigative work will be conducted in response to this proposed development. However, if previously unknown cultural or

paleontological materials are identified during project related activities, all work would cease until a professional assessment of such resources can be made.

DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR, AND ENERGY

There would be no measurable direct, secondary, and cumulative impacts related to environmental resources of land, water, air, and energy due to the relatively small size of the timber sale project.

OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

- No other environmental documents are pertinent to this project.

Impacts on the Human Population

HUMAN HEALTH AND SAFETY

Air Quality

The DNRC is a member of the Montana/Idaho Airshed Group which was formed to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction (Montana/Idaho Airshed Group 2006). The Group determines the delineation of airsheds and impact zones throughout Idaho and Montana. Airsheds describe those geographical areas that have similar atmospheric conditions, while impact zones describe any area in Montana or Idaho that the Group deems smoke sensitive and/or having an existing air quality problem (Montana/Idaho Airshed Group 2006).

The project area is located within Montana Airshed 1, which encompasses portions of Lincoln County. Currently, this Airshed contains one impact zone but the project area is well outside of that zone.

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to air quality:

- Smoke will be produced during pile burning.
- Dust will be produced during harvesting and hauling activities.

Recommended Mitigation Measures for Air Quality- The analysis and levels of effects to air quality are based on implementation of the following mitigation measures:

- Only burn on days approved by the Montana/Idaho Airshed group and DEQ.
- Conduct test burn to verify good dispersal.
- Dust abatement may be used as necessary.
- Slower speed limits may be included in contracts as necessary to reduce dust.

-SLASH BURNING

No-Action Alternative:
No slash would be burned within the project areas. Thus, there would be no effects to air quality within the local vicinity and throughout Airshed 1.

Action Alternative:

Direct and Secondary Effects
Slash consisting of tree limbs and tops and other vegetative debris would be piled throughout the project area during harvesting. Slash would be burned after harvesting operations have been completed. Burning would introduce particulate matter into the local airshed, temporarily affecting local air quality. Over 70% of emissions emitted from prescribed burning are less than 2.5 microns (National Ambient Air Quality PM 2.5). High, short-term levels of PM 2.5 may be hazardous. Within the typical column of biomass burning, the chemical toxics are: Formaldehyde, Acrolein, Acetaldehyde, 1,4 Butadiene, and Polycyclic Organic Matter. Burning within the project area would be short in duration and would be conducted when conditions favor good to excellent ventilation and smoke dispersion as determined by the Montana Department of Environmental Quality and the Montana/Idaho Airshed Group. The DNRC, as a member of the Montana/Idaho Airshed Group, would burn only on approved days.

Thus, direct and secondary effects to air quality due to slash burning associated with the proposed action would be minimal.

Cumulative Effects
Cumulative effects to air quality would not exceed the levels defined by State of Montana Cooperative Smoke Management Plan (1988) and managed by the Montana/Idaho Airshed Group. Prescribed burning by other nearby airshed cooperators (for example the U.S. Forest Service) would have potential to affect air quality. All cooperators currently operate under the same Airshed Group guidelines. The State, as a member, would burn only on approved days. This should decrease the likelihood of additive cumulative effects. Thus, cumulative effects to air quality due to slash burning associated with the proposed action would also be expected to be minimal.

-DUST

No-Action Alternative:
No increased dust would be produced as a result of the proposed timber sale. Current levels of dust would be produced in the area.

Action Alternative:

Direct, Secondary, and Cumulative Effects
Harvesting operations would be short in duration. Dust may be created from log hauling on portions of native surface roads during summer and fall months. Contract clauses would provide for the use of dust abatement or require trucks to reduce speed if necessary to reduce dust near any affected residences.

With the application of these mitigations direct, secondary, and cumulative effects to air quality due to harvesting and hauling associated with the proposed action would be minimal.

Log Hauling Traffic

Log hauling traffic is common in the project area.

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to log hauling traffic:

- There will be increased travel on weekdays.
- Trucks will drive fast.

Recommended Mitigation Measures for Log Hauling Traffic- The analysis and levels of effects of log hauling traffic is based on implementation of the following mitigation measures:

- Log hauling would take place typically from during the general "work week" (Mon. thru Fri).
- Signs would be posted making the public aware of log hauling traffic in the area.
- If necessary, a slower speed limit may be imposed in the timber harvest contract.

No-Action Alternative:
No increase in log truck traffic would occur.

Action Alternative:

Direct, Secondary, and Cumulative Effects
Log truck traffic in the area would increase for the duration of the timber sale. However signs would be posted indicating that log truck traffic is present in the area. If necessary, a slower speed limit may be imposed in the timber harvest contract.

Based on the mitigation measures direct, secondary, and cumulative effects of log hauling on human health and safety would be minimal.

RECREATION *(including access to and quality of recreational and wilderness activities):*

The area is used for hunting, snowmobiling and general recreating. Recreational activities that are not dependent on open roads in the area would be affected slightly by the action alternative. Harvest plans would result in a more open, accessible forest for humans, likely increasing quality of both hiking and hunting opportunities. The no-action alternative would have no effect on recreation in the project area.

Currently, roads through the project area are open to motorized use. Before this project would commence, a gate would be installed at the state section line, limiting motorized recreation in the area. This gate will be installed regardless of alternative selected to limit illegal activities currently taking place in this area. The action alternative would improve some roads currently unusable for recreationalists. This would result in better accessibility of the area for recreational uses. Only summer motorized use will be negatively affected by future projects in this area, but, as has been stated, this closure will occur regardless of alternative selected.

Will Alternative result in potential impacts to:	Impact												Can Impact Be Mitigated?	Comment Number
	Direct				Secondary				Cumulative					
	No	Low	Mod	High	No	Low	Mod	High	No	Low	Mod	High		
No-Action														
Health and Human Safety	**x**				**x**				**x**					
Industrial, Commercial, and Agricultural Activities and Production	**x**				**x**				**x**					
Quantity and Distribution of Employment	**x**				**x**				**x**					
Local Tax Base and Tax Revenues	**x**				**x**				**x**					
Demand for Government Services	**x**				**x**				**x**					
Density and Distribution of Population and Housing	**x**				**x**				**x**					
Social Structures and Mores	**x**				**x**				**x**					
Cultural Uniqueness and Diversity	**x**				**x**				**x**					
Action														
Health and Human Safety		**x**			**x**				**x**					
Industrial, Commercial, and Agricultural Activities and Production		**x**			**x**				**x**					
Quantity and Distribution of Employment	**x**				**x**				**x**					
Local Tax Base and Tax Revenues	**x**				**x**				**x**					
Demand for Government Services	**x**				**x**				**x**					
Density and Distribution of Population and Housing	**x**				**x**				**x**					
Social Structures and Mores	**x**				**x**				**x**					
Cultural Uniqueness and Diversity	**x**				**x**				**x**					

1. By meeting the mitigations as described in the log hauling traffic section of the EA any short term effects to health and human safety can be mitigated to the greatest practicable extent. These effects would also be very short term and only present during actual hauling by log trucks.
2. Timber harvesting would result in 2.5 MMBF delivered to Montana sawmills. This much needed timber would help continue the legacy of Montanans producing high quality wood products.

LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS ***(includes local MOUs, management plans, conservation easements, etc):***

OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

The proposed action has a projected harvest volume between 2.5 and 3 MMBF. This volume is worth approximately $360/MBF delivered to a forest products manufacture site at current market prices. Delivered to market, the proposed action has a total revenue value of an estimated $900,000. Removing the timber sale purchaser's contracted operations and DNRC's development, administration, and operation expenses, the trust beneficiaries net between an estimated 15 and 35 percent of total delivered saw log market value. Therefore, the proposed action may generate net income for trust beneficiaries between $135,000 and $315,000.

Costs related to the administration of the timber sale program are only tracked at the Land Office and Statewide level. DNRC does not track project-level costs for individual timber sales. An annual cash flow analysis is conducted on the DNRC forest product sales program. Revenue and costs are calculated by land office and statewide. These revenue-to-cost ratios are a measure of economic efficiency. A recent revenue-to-cost ratio of the Northwestern Land Office was 2-1. This means that, on average, for every $1.00 spent in costs, $2.00 in revenue was generated. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return.

Mills in Montana need 351 MMBF per year to maintain current production levels and industry infrastructure. Currently the Sustained yield and target harvest from Trust Lands is 57.6 MMBF, which represents approximately 16.4% of timber harvested in the state of Montana. This project would provide approximately 2.5 MMBF of timber towards the sustained yield target thus helping sustain current mill capacity.

Environmental Assessment Checklist Prepared By:

Name: Pete Seigmund
Title: Forester
Date: 2/7/2017

Finding

Alternative Selected

Action Alternative

Significance of Potential Impacts

No significant impacts are expected with the selection of the action alternative. Harvest and the removal of dead, dying and Infected trees will enhance the overall health of the forest and the removal of the dominant variety of shade tolerant trees will bring those stands closer to historic conditions. This treatment will create the opportunity for the stand to grow more vigorous and will help the stand be more resistant to future infestations of insect and disease. The project area is classified for timber management and the action alternative is appropriate within this classification. It is expected that the treatment of the Old Growth stands with a maintenance harvest will help these stands maintain their determinate old growth qualities for a longer period of time. There are no unique resources or habitats associated with the project area which would

indicate anything but short term or minor impacts occurring as a result of the harvest actions and the timing of those actions. Appropriate mitigation within the action alternative has been implemented for wildlife, soils, vegetation, water, and other concerns.

Need for Further Environmental Analysis

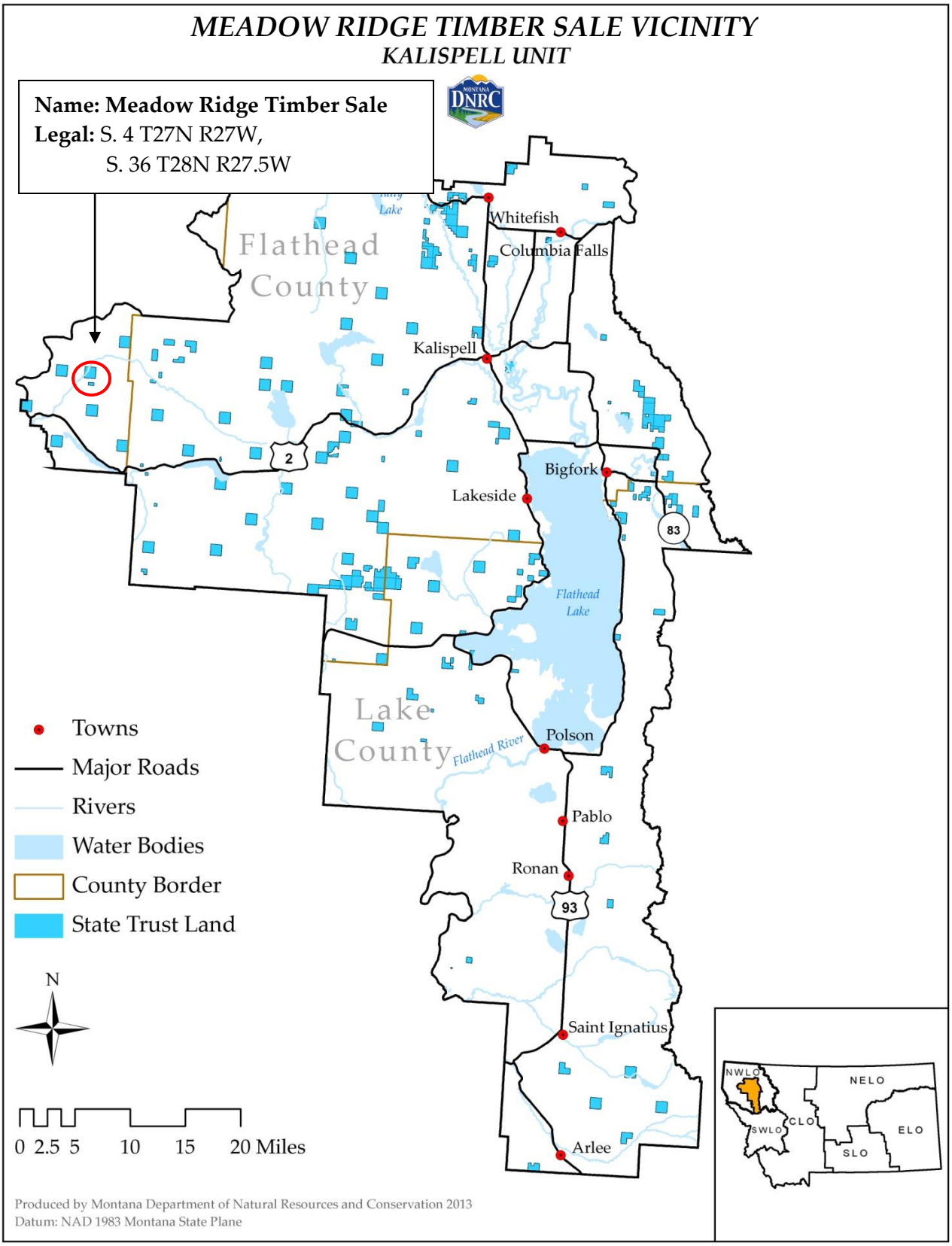
☐	EIS	☐	More Detailed EA	☒	No Further Analysis

Environmental Assessment Checklist Approved By:

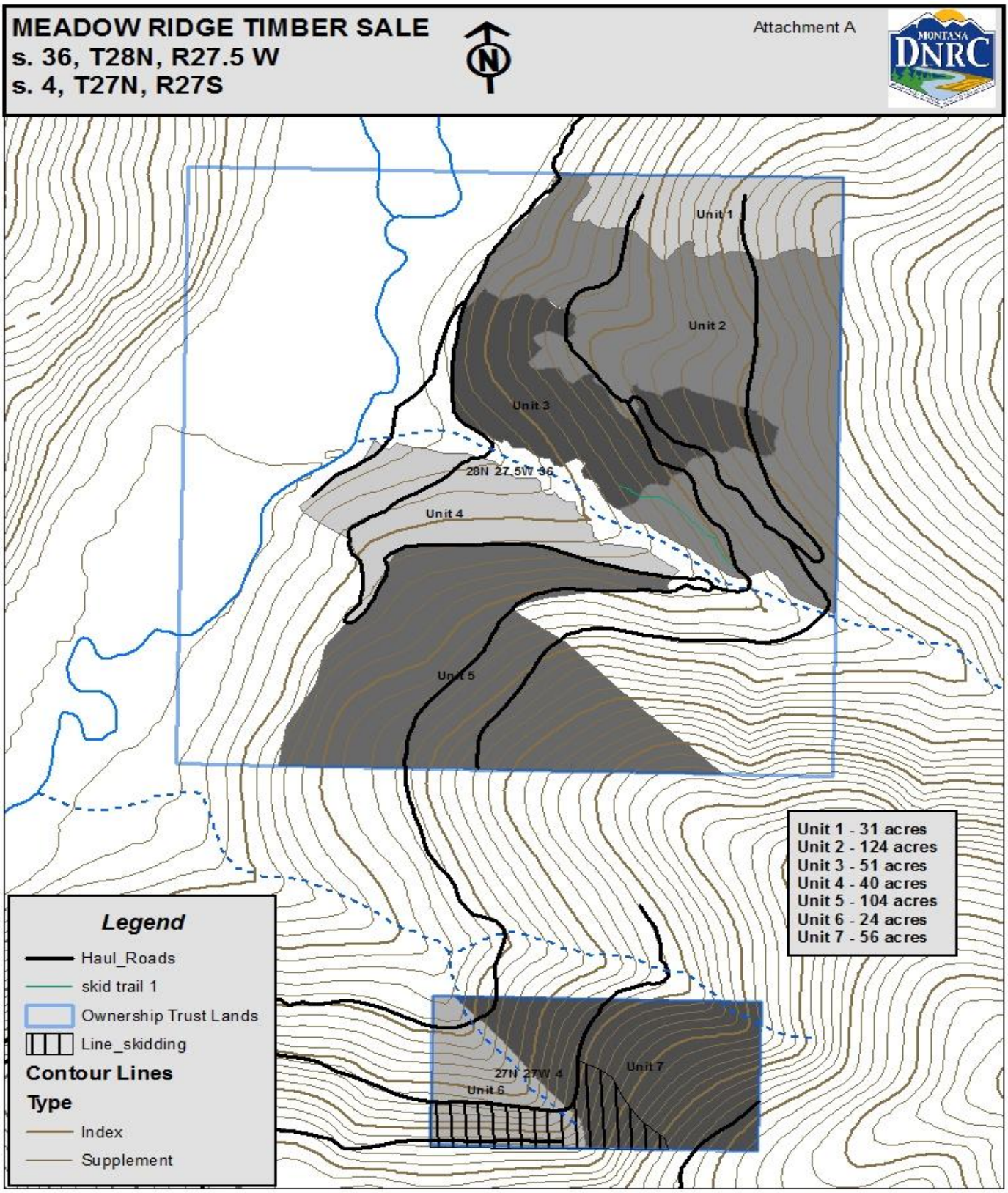
Name: David M. Poukish
Title: Kalispell Unit Manager, DNRC
Date: June 28, 2017
Signature: /s/ David M. Poukish

Attachment A - Maps

A-1: Meadow Ridge Timber Sale Vicinity Map



A-2: Timber Sale Harvest Units



Attachment B – Vegetation

Vegetation

The vegetation section describes present conditions and components of the forest as well as the anticipated effects of both the No Action and Action Alternatives. Issues expressed during initial scoping by the public and internal were:

- Timber harvesting and associated activities may affect stand characteristics with regards to species composition, stand age, and succession.
- Timber harvesting and associated activities may affect stand structure and development.
- Overstocked stand conditions are contributing to loss of timber productivity and may increase risk of mortality from insect and disease.
- Timber harvesting and associated activities may affect the distribution and quality of old growth stands.

Analysis Areas

This analysis area includes 3 geographic scales for assessing potential direct, indirect, and cumulative effects on forest cover type, species composition, the distribution of age classes, structural stages, and fragmentation.

- Climatic Section M333B- **Lower Flathead Valley (Losensky 1997) Scale** was used in this analysis for comparing historic conditions related to the distribution of forest cover types and age classes, to current conditions within the project area. The Lower Flathead Valley geographic area includes Flathead Lake west to the Montana border, from the Canadian border south to Missoula, MT (Losensky 1997).

- The **DNRC Kalispell Landscape Scale** includes all scattered forested Trust land parcels, administered by the Kalispell Unit for DNRC. This geographic area is a subset of the above Lower Flathead Valley Climatic Section and includes school trust lands in the vicinity of Whitefish, MT south to Arlee, MT and school trust lands in the vicinity of Bigfork, MT west to the Thompson Chain of Lakes. Current and appropriate conditions related to forest cover types and age class distribution were analyzed on this scale.

- The **Meadow Ridge Project Scale** includes all trust lands within the project area specified in Chapter One and more specifically, those stands proposed for harvesting under each alternative. This scale was used to analyze expected changes in current forest conditions of the project area.

Analysis Methods

Administrative Rules of Montana (ARM 36.11.404) direct DNRC to take a coarse filter approach to favor an appropriate mix of stand structures and compositions on State lands, referred to as a desired future condition. The following characteristics: forest composition, age class distribution, cover type, and structure, are used to describe current forest and stand conditions in comparison to the estimated natural forest characteristics for Montana prior to extensive influences from fire suppression, logging, and development. This analysis will compare the desired stand conditions that DNRC believes to be appropriate for the site with current stand conditions.

Forest/Timber Analysis Methods

The method used to analyze current and desired future stand conditions, old growth timber stands, and stand development are as follows:

- *Current and Desired Future Conditions:* The DNRC site-specific model (ARM 36.11.405) was used to determine the characteristics of the desired future condition and to evaluate the potential direct, indirect, and cumulative effects. This model assigns a desired future condition in terms of cover type for each stand identified in the DNRC's Stand Level Inventory (SLI). At the administrative unit level, the aggregate acreage of each desired future cover type describes a broad picture of the desired future conditions at both the project and landscape (administrative unit) levels. Current conditions are described by DNRC's 2006 SLI for the Kalispell Unit. More recent field observations and tree data were gathered to verify and further refine descriptions of specific forest stand characteristics within the project area. This data is available at the Kalispell Unit.

- *Old Growth Timber Stands:* The methods to identify old growth stands, as defined by ARM 36.11.403 (48), are based on the Kalispell Unit SLI data. The process uses the SLI to identify stands that may meet the minimum criteria (number of trees per acre that have a minimum DBH and minimum age) for a given habitat type group as described in Green et al (1992), Old Growth Forest Types of the Northern Region. Field surveys were used to verify stands that met the definition.

- *Stand Structure/Development:* The analysis on stand structure and development is qualitative and discusses the conditions of timber stands, including how various natural and man-caused disturbances and site factors have affected and may continue to affect timber stand development.

- *Cover Types and Age Classes:* Climatic Section M333B- Lower Flathead Valley (Losensky 1997) was used in this analysis for comparing historic conditions related to the distribution of forest cover types and age classes, to current conditions within the project area. The Lower Flathead Valley geographic area includes Flathead Lake west to the Montana border, from the Canadian border south to Missoula, MT (Losensky 1997).

Noxious Weeds Analysis Methods

- During field reconnaissance, DNRC personnel assessed road conditions, road locations, various susceptible timber stands, and generally evaluated noxious weed occurrence, extent, and location.

General Forest Vegetation Information

The existing vegetative types, more specifically forest habitat types and cover types within the Kalispell Landscape and the Meadow Ridge project area reflect the varied influences of site factors, fire regimes, disturbance patterns, and past management activities.

Site conditions vary depending upon the physiographic and climatic factors associated with geographic locations. Soil types, slope aspect and position, length of growing season, and moisture availability influence the type, growth, and development of forest vegetation. These site factors are considered in the forest habitat classifications (Pfister et al. 1977) used to generally describe forest vegetation, forest stand development, and relative forest productivity associated with given site and climatic factors.

Stand History and Past Management

Meadow Ridge Project Area: The project area's first recorded harvest was in 1956 in section 36. An additional harvest was recorded in 1967 and the final full scale timber harvest occurred in 1979, when 3.5 MMBF of

timber was harvested and 6.2 miles of new road was constructed. Several small salvage permits were completed in the early 1980's.

There are no recorded Christmas tree permits issued for the project area and the only other permit recorded was for decorative rock in 2001, for an area in the northwest corner of section 36.

The project area contains fire scars from at least 4 large fires that burned through the project area. These occurred early in the previous century and no record of suppression exists.

Adjacent lands to Meadow Ridge: The lands adjacent to Meadow Ridge are largely industrial timberland and have been heavily managed in the past with varying degrees of success in establishing new timber stands.

Forest Habitat Types - Current

Forest habitat in the project area is primarily grouped into three types. The most common forest habitat type in the project area (22%) is the moderately warm/dry Douglas-fir/ pinegrass (*Pseudotsuga menziesii/Calamagrostis rubescens)*. This forest habitat type occurs on moderately dry mountainsides and upper slopes. As is expected the old growth stands of this habitat type in the project area exhibit a park-like appearance. The understory of this habitat type is commonly dominated by elk sedge (*Carex guyeri)* or pinegrass (*Calmogrostis rubescens).* Timber productivity is low to moderate in this forest habitat type.

Douglas fir/ dwarf huckleberry (*Pseudotsuga menziesii/Vaccinium caespitosum)* is the next most common (21%) forest habitat type in the project area. This type is common on relatively warm and moist but well drained benches and gentle slopes (Pfister et. Al. 1977). Overstory is commonly characterized by large fire scarred seral trees with a low dense layer of grassy understory. Timber productivity is high in this forest habitat type, especially for ponderosa pine (*Pinus ponderosa*).

Grand Fir/ Twinflower (*Abies grandis/ Linnaea borealis)* forest habitat type ranks third (20%) in the project area. This type is common on Northerly to Southeasterly aspects between 3,700 and 5,500 feet. The overstory in this forest habitat type is usually a mix of Douglas fir, Western larch and ponderosa pine. Twinflower often forms an extensive mat on the forest floor. Timber productivity is high in this type, offering good opportunity for timber management.

Across the remainder of the proposed project area subalpine fir/ queenscup beadlilly (*Abies lasiocarpa/ Clintonia uniflora),* Douglas fir/ twinflower (*Pseudotsuga menziesii/ Linnaea borealis)*, and Grand fir / Queenscup beadlilly (*Abies Grandis/ Clintonia uniflora)* are well represented.

Fire Regimes

Fire regimes for the Kalispell Landscape are variable, given the broad and scattered nature of trust lands, but are predominately within the moderate severity fire regime. As a whole, the forest exists as a mosaic of differing age and size classes that have developed from a variety of factors. These factors include, human activities, fire frequencies and intensities and their relationships to other site factors such as aspect, elevation, weather, stand structure and fuel loadings. Traditionally fire severity is tightly linked to the interval between fires and the amount of fuel loading that occurs in that time interval.

Areas of frequent, low severity fires have produced western larch/Douglas-fir, ponderosa pine, and Douglas-fir cover types. These fire regimes lead to many small open patches across the landscape. Historically, by

regularly consuming forest fuels, killing small trees, and pruning boles of small trees these low severity regimes maintained stand conditions that were resistant to stand replacement fires.

Moderate severity fire regimes are characterized by a longer interval between fires than low severity regimes and an intermediate severity of fire behavior. This fire regime often leads to larger gaps in the canopy where limited torching of mature trees will occur as well as areas where only ground fuels are consumed, leaving the canopy intact. This fire regime results in mixed species stands as seral trees grow among shade tolerant in the gaps left by fire.

High severity fire regimes are characterized by stand replacing crown fires. Often the time period between these fires is much greater than in either of the two previously described regimes. These fires are also more likely to occur in dense wet forests and generally require specific weather conditions, typically drought, and heavy fuel loading to occur. This fire regime is often compared to clearcutting in forest management; the forest can be either seral dominated or secondary dominated dependent on the amount of time since the last fire event.

A mosaic of multi-age patches and fuel loadings are present in the project area. The Meadow Ridge project area would be classified in a mixed-severity fire regime. The moderately warm and dry habitats, which occur on the west to south slopes, historically had more frequent and less severe fire events occurring every 20 years or less. Fuel loadings in this part of the project area currently average less than 20 tons/acre as measured in coarse woody debris transects. The cool and moist habitats, which occur on the northwest to northeast slopes, tend to have stand replacement events that occur every 200 years or more. Fuel loadings in this part of the project area vary from 15 tons/acre to 30+ tons/acre. The last fire event of any size is not known, but fire scar evidence suggests several fires of mixed severity took place and burned across most of the project area.

Forest Cover Type and Age Class Distribution Existing Conditions

Table B-1 compares the DNRC Kalispell Landscape (Current Cover Type) with historical data from Losensky (1997) for the Lower Flathead Valley section, as an assessment of desired future conditions for cover types.

Table B-1: CURRENT COVER TYPES AND DESIRED FUTURE CONDITIONS FOR KALISPELL UNIT

Cover Type	Current Cover Type (acres)	Desired Future Condition (acres)	Current Type Minus (-) DFC (acres)**
Subalpine fir	996.5	168.8	827.7
Douglas-fir	4500	398.9	4101.1
Hardwoods	243.6	299.4	-55.8
Lodgepole pine	1489.9	842.3	647.6
Mixed Conifer	8764.5	1347.8	7416.7
Ponderosa pine	9567.2	17754.2	-8187
Other*	3815.7	3083.7	732
Western larch/Douglas-fir	22460.6	24869.6	-2409
Western white pine	1732.4	4805.7	-3073.3
TOTAL	53570.4	53570.4	

*Other= non-stocked lands, non-forest, or water.
**The Current Type minus DFC Type column above lists the excess and deficit (-) acres for each Cover Type

The ponderosa pine, western larch/Douglas-fir, and western white pine cover types are not as well represented within the Kalispell Unit Landscape as estimated for the early 1900's. Most notable is the conversion of over 10,000 acres in the ponderosa pine, western larch/Douglas-fir, and western white pine cover types over the last 100 years, to the present over-abundance of the mixed conifer, Douglas-fir and subalpine fir cover types.

The longer intervals between disturbances and commodity extraction generally explain the decrease in the western larch/Douglas-fir and ponderosa pine cover types. Active fire suppression initiated in the early 1900's has interrupted wildfire frequencies and intensities in conjunction with 50 years or more of logging practices that favored the removal of commercially valuable western larch, ponderosa pine, western white pine and Douglas-fir for railroad ties, mining timbers, and construction lumber. Many open, mature stands dominated by western larch and other seral sepcies with even-aged patches of immature seral trees in the understory have been replaced with more densely stocked stands in both the overstory and understory. These stands often include a higher percentage of more shade tolerant trees such as Douglas-fir, grand fir, or spruce as a result of longer intervals between disturbances.

Table B-2 compares the Meadow Ridge project area current cover type with historical data from Losensky (1997) for determining desired future conditions.

Table B-2: CURRENT COVER TYPES AND DESIRED FUTURE CONDITIONS FOR MEADOW RIDGE HARVEST AREA

Cover Type	Current Cover Type (acres)	Desired Future Condition (acres)	Current Type Minus (-) DFC (acres)**
Subalpine fir	0	0	0
Douglas-fir	0	0	0
Hardwoods	0	0	0
Lodgepole pine	87.4	36.4	51
Mixed Conifer	22.4	80.1	-57.7
Ponderosa pine	313	442.7	-129.7
Other*	39.3	20	19.3
Western larch/Douglas-fir	204.6	87.5	117.1
Western white pine	53.1	53.1	0
TOTAL	720	720	

*Other= non stocked lands, non-forest, or water.
**The Current Type minus DFC Type column above lists the excess and deficit (-) acres for each Cover Type.

Based upon this table management should promote a shift from western larch /Douglas-fir, lodgepole pine and non-stocked towards more ponderosa pine and mixed conifer forest. The lack of mixed conifer forest is likely a result of increased Western larch/ Douglas Fir cover that was promoted in previous harvests across wetter parts of the project area. Eventual conversion back to mixed conifer stands should occur naturally as shade

tolerant species currently flourish in the understory. Ponderosa pine would be promoted by removing shade tolerant species and by providing appropriate site preparation for establishment of ponderosa pine regeneration.

Table B-3 Displays Age Class Distributions on the Project and Landscape Scales.

Table B-3: PERCENT OF ANALYSIS AREAS BY AGE CLASS GROUPS

Analysis Area	Age Class (Years)			
	00-39	40-99	100-149	150+
M333B (Historic)	36%	13%	15%	36%
Kalispell (Current)	10%	21%	30%	39%
Meadow Ridge Project Area	6%	8%	38%	31%

Stands in the age classes 0-39 are under-represented in the project area when compared to the historical conditions, and the 100 to 149 age class is over-represented. This deviation from historical conditions can be partially explained by successful fire suppression increasing the interval between large, stand replacement fires and logging practices that did not necessarily create a similar disturbance regime to historical conditions.

Environmental Effects to Forest Age Class & Cover Type Distribution

No Action Alternative- Direct and Indirect Effects

Under the No Action Alternative, natural processes would continue to have an effect on these forest characteristics. In the absence of wildfires, older age-classes will continue to dominate the project area and 0-39 and 40-99 age classes would continue to decline as the 70-80 year old trees move into the next age class without replacement. Forest cover type distribution would continue the conversion from ponderosa pine cover types to Douglas-fir and mixed conifer cover types.

No Action Alternative- Cumulative Effects

Under the No Action Alternative, there would likely be a decline in the overall acreage of ponderosa pine cover types on the Kalispell Unit. Ponderosa pine composition would continue to decrease, leading to a shift from these cover types to Douglas-fir and mixed conifer cover types. Across the landscape, fire suppression, insect and disease occurrence, and increasing human use may influence cover type and age class distribution to an unknown degree. In the absence of stand replacement fires or regeneration timber harvesting, variability of age class and cover type distribution would decline.

Action Alternative- Direct and Indirect Effects

Under the Action Alternative, timber harvesting would occur on 430 acres. Old-growth restoration and maintenance treatments would occur on 162 acres. Seed tree treatments on 268 acres. Harvest prescriptions would favor removal of shade tolerant trees and retention of seral species. Healthy Douglas-fir would also be retained to help achieve desired stocking levels. Ponderosa pine, western white pine and western larch would be favored over Douglas-fir. Reduction in Douglas-fir overstory would increase the proportion of other species

and may result in a change in composition. The average age of some treated stands would decrease, although most stands would remain in the same age class after harvest.

Action Alternative- Cumulative Effects

The action alternative should have a positive cumulative effect on cover type and age class distributions. Proposed timber harvest activities would promote a more historic cover type and age distribution across the project area. Across the landscape, fire suppression, insect and disease outbreaks, and increasing human use may influence cover type and age class distribution to an unknown degree.

Old Growth Existing Conditions

DNRC uses the minimum criteria described in *Old Growth Forest Types of the Northern Region* (Green et al. 1992) to determine old-growth stands on state lands. Green et al. described characteristics of old-growth forests in Montana and provided the minimum amounts of trees per acre of a given diameter at breast height (DBH) and age for each old-growth type. DNRC classifies stands that meet or exceed those minimums as old growth.

Based on SLI data and field surveys across the Kalispell Unit, approximately 3.4 percent of the Kalispell Unit can be classified as old growth.

Table B-4 Old Growth Acres by Cover Type on Kalispell Unit.

Table B-4: Old Growth Acres By Cover Type On Kalispell Unit*							
Ponderosa Pine	**Douglas-fir**	**Lodgepole Pine**	**Mixed Conifer**	**Subalpine Fir**	**Western larch/Douglas-fir**	**Western White Pine**	**Total**
523	37	10	231	98	855	118	**1,872**

**This information comes from the SLI and field reconnaissance done during 2009-14.*

Table B-5 displays old growth stands by cover type for the Meadow Ridge Project Area.

Table B-5: Old Growth Acres By Cover Type on Meadow Ridge Project Area		
Ponderosa Pine	**Mixed Conifer**	**Western Larch/Douglas-fir**
102.1	80	103.5

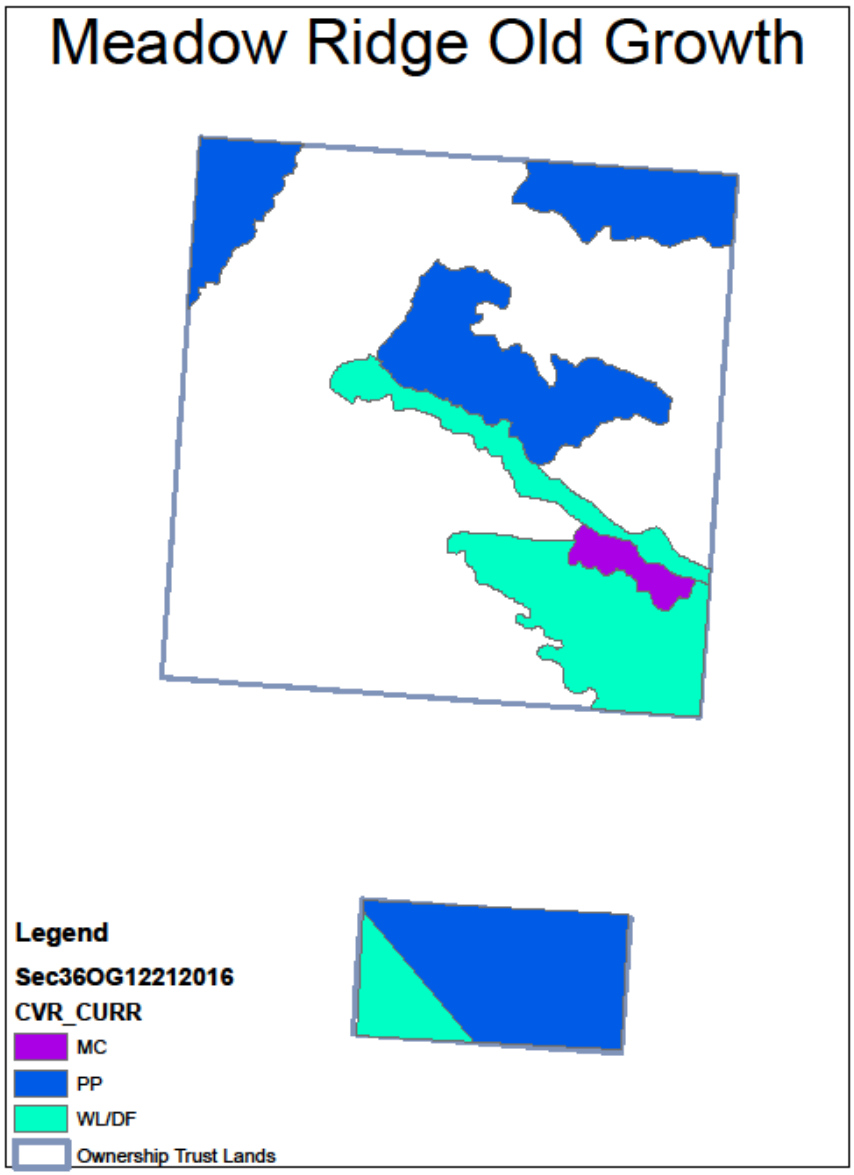
Old-Growth Attributes

DNRC has developed a tool called the Full Old Growth Index (FOGI) to describe the level of attributes commonly associated with old growth for stands on state lands. The attributes considered are:

- Number of large live trees
- Number of snags
- Amount of coarse woody debris
- Amount of decadence
- Multistoried structures
- Gross Volume

These attributes are assigned a value or index rating, when summed with the values or index ratings of the other attributes, indicate a total score or index rating for the stand. These scores can be grouped into low, medium, and high attribute categories. This provides an indication of the condition of the stand in reference to attributes that are often associated with old-growth timber stands. These attribute levels are not necessarily an indication of quality, but are tools to compare and classify a collection of older stands over the landscape.

There are approximately 285 acres of old growth within the project area. Old-Growth restoration treatments would occur across approximately 165 of these acres.



Environmental Effects to Old Growth

No Action Alternative- Direct and Indirect Effects

Under the No Action Alternative, stands that currently meet DNRC's old growth definition would become more decadent. Stocking levels and the loading of down woody debris would increase in some stands, increasing wildfire hazards. Shade tolerant species would continue to replace shade-intolerant species. Various factors, such as insects and diseases, would eventually cause more snags to occupy portions of the stands.

No Action Alternative- Cumulative Effects

Stands that currently meet Green et al. old growth definition would become more decadent. Stocking levels and the loading of down woody debris would increase in some stands, increasing wildfire hazards. Shade-tolerant species would remain the major species component in the understory of stands. Various factors, such as insect and diseases, would eventually cause more snags to occupy portions of the stands. Stands that do not currently meet Green et al. Old Growth definition but are close may develop the attributes necessary to be classified as old growth in the future. This would increase the amount of old growth on the Kalispell Unit by 66 acres. Stands that currently meet Ponderosa pine old growth would likely convert to mixed types over time as dominant ponderosa pine old growth trees are replaced by shade tolerant species.

Action Alternative- Direct and Indirect Effects

Approximately 138 acres of old growth restoration harvest would occur with this alternative. Old-Growth restoration treatments are prescribed for ponderosa pine old growth stands. This treatment would return old growth stands to the park-like forest that is typical of these stands. The post-treatment timber stands would continue to meet DNRC's criteria for old growth. Treatment goals would include reducing overall shade tolerant species present in these stands as well as reducing fire and disease risks.

Western Larch/Douglas Fir old growth types (~16 acres) would receive old-growth maintenance treatment. This treatment attempts to maintain DNRC old growth criteria in the stand while reducing insect, disease and fire risks to the greatest extent practicable.

Action Alternative- Cumulative Effects

The post treatment stands would continue to meet DNRC's criteria for old growth and would not affect the overall distribution of old growth on the Kalispell Unit. Restoration treatments would promote patches of regeneration of seral species in order to maintain ponderosa pine old growth across these areas. As older large diameter seral trees die they would be replaced by a new cohort of dominant seral species. Through active management ponderosa pine old-growth characteristics would be maintained. In the maintenance treatment area insect, disease and fire risks would be reduced; this would increase the odds that this stand would stay within DNRC old growth criteria for the greatest possible amount of time.

Stand Structure and Development

Existing Condition

Stand structure and patch size indicates a characteristic of stand development and disturbance and how a stand may continue to develop. Stand structure is classified as single-storied, two-storied, or multi-storied. Patch size for this project is estimated from stand sizes and provides further insight into the severity of the disturbance as it relates to dominant tree canopies. Table B-6 displays the percent of area in the Meadow Ridge Project Area and the Kalispell Landscape by stand structure class and estimated stand (or patch) size.

Table B-6: PROPORTION OF ANALYSIS AREA BY STAND STRUCTURE AND ESTIMATED PATCH SIZE				
Stand Structure	**Kalispell Landscape**	**Kalispell Average Patch Size**	**Meadow Ridge Project Area**	**Meadow Ridge Average Patch Size**
Single Storied	15%	24	<1%	6 acres
Two-Storied	3%	28	<1%	6 acres
Multi-Storied	82%	31	98%	25 acres

Single-storied stands are most often associated with stand replacement events, such as severe fires or regeneration harvests, including clearcutting or seedtree cutting. Stands are fairly simple in vertical structure and are often even-aged. Regeneration harvests, such as seedtree and shelterwood, which retain 10% or more of the upper crown canopy and have a seedling sapling understory, are considered two-storied stands. Two-storied stands have simple vertical structure and are frequently even-aged, although two age classes are usually present. The multi-storied condition arises when a stand has progressed through time and succession to the point that trees in the lower canopy levels are advancing into the upper canopy levels; this is frequently seen when shade-tolerant species capable of surviving and growing in shaded understory conditions progress upward into the overstory. Three or more age classes may be present in these stands and vertical structure can be complex. These stands often experience a long interval between disturbances.

Stand size refers to openings created by disturbances and provides insight regarding the severity of a disturbance even on tree mortality. Larger patch sizes are generally associated with moderate and high severity fire regimes or regeneration harvests. Smaller sizes are attributed to low or moderate severity fire regimes and harvest treatments that retain larger proportions of the overstory.

Environmental Effects to Stand Structure and Development

No Action Alternative- Direct and Indirect Effects

Under the No Action Alternative, stand structure and development would continue to change as a result of natural processes. Older stands (150+) comprise 60% of the project area and are experiencing reductions in live tree canopy due to insects and age related mortality. The mosaic pattern of multi-aged and multi-storied stands is likely to persist with this type of disturbance. More shade tolerant species would increase in all canopy levels continuing to replace or inhibit growth of seral species, as dense small diameter trees develop in the understory. Area coverage of forest in early successional stages, especially in larger patch sizes, would continue to decrease. Forest fuels would continue to build up in stand areas where mortality is occurring, increasing the potential for severe, less controllable fires that may result in large scale stand replacement fires.

No Action Alternative- Cumulative Effects

Forest succession and fire suppression would continue. Conditions favoring the establishment of shade tolerant species in the canopy gaps, the slow establishment and growth of seedlings and saplings in closed canopies, and increasing fuel loadings would continue.

Action Alternative- Direct and Indirect Effects

Under the Action Alternative, proposed silvicultural prescriptions (old-growth restoration, seed tree, commercial thin) would maintain current stand ages and structures, although canopy closure and forest fuels would be reduced. Harvest prescriptions would retain some of the mid and lower-canopy, favoring seral species and vigorous trees. After slash disposal treatments are completed, more fire resistant stand conditions and structures would be maintained for several decades.

The percentage of multi-storied stand structures and patch size would not appreciably change from current levels.

Action Alternative- Cumulative Effects

The Action Alternative would result in promotion of characteristics of a mixed-severity fire regime. Seral species would be favored and promote their future development in the overstory and reverse the current trend of shade intolerant development in the overstory. Across the Kalispell Unit, the Action Alternative would not appreciably change the percentage of multi-storied stands across the landscape.

Timber Productivity

Existing Condition

Tree Vigor: Radial growth rates are static to declining for a majority of the project area. Over 80% of the project area is in the 150+ age class. Stand age and low vigor is also making the stands more susceptible to bark beetle attacks.

Insects:

Bark Beetles: Various species of bark beetles have been active in the Meadow Ridge project area. Three species of bark beetles were identified in field reconnaissance and are responsible for much of the activity and subsequent tree mortality.

- The mountain pine beetle (*Dendroctonus ponderosae*) was most active in the lodgepole pine during the last two decades. It was responsible for attacking the lodgepole pine found throughout the project area. The mountain pine beetle is currently at endemic levels in the project area with scattered trees noted as being successfully attacked.

- The fir engraver (*Scolytus ventralis*) was active in the mid 90's through 2000 and affected the grand fir found in the moist draws in both sections of the project area. Currently, the fir engraver is at endemic levels in the project area with few overstory grand fir showing successful attacks as noted during field reconnaissance.

- The Douglas-fir (*Dendroctonus pseudotsugae*) bark beetle has been active over the past decade and is mostly affecting the older Douglas-fir overstory across the entire project area. While current beetle

numbers are at endemic levels in the project area, small pockets of successful attacks are still being found in the project area.

Dwarf Mistletoes:

- Western larch dwarf mistletoe (*Arceuthobium laricis*) is the most common mistletoe found in the project area. It is affecting the larch in all canopy levels and is heavily infecting the older larch in section 4 of the project area.

- Lodgepole pine dwarf mistletoe (*Arceuthobium americanum*) is at low levels and only scattered trees were affected in the project area.

- Stem Decays: Minor amounts of Indian paint fungus (Echinodontium tinctorium) and white pocket rot (Phellinus pini) were found in the project area. Indian paint fungus is affecting the grand fir and the white pocket rot is affecting the older western larch across the project area.

Root Diseases: Brown cubical root and butt rot (Phaeolus schweinitzii) is affecting the older Douglas-fir stands across the project area.

Environmental Effects to Timber Productivity

No Action Alternative- Direct and Indirect Effects

Timber vigor would continue to decline across the project area. Growth rates of individual trees in dense, older stands would remain static or decline as opportunities for establishment of replacement trees would be limited to small openings favoring shade tolerant trees. Development of large diameter western larch as a persistent component of older stands would be hindered.

Poor vigor and overstocked stand conditions would likely increase the risk of damage and mortality from all species of bark beetles, especially the Douglas-fir bark beetle.

Stem decays would continue to persist in the overstory with the amount of older-aged stands in the project area.

Dwarf mistletoe, which is affecting the western larch and lodgepole pine would continue to spread in both the overstory and the understory.

Root diseases, specifically brown cubical butt rot, which is affecting the older-aged Douglas-fir stands, would continue to persist. This persistence would have a continued deleterious effect on the forest, particularly in overstory Douglas-fir.

No Action Alternative- Cumulative Effects

Without silvicultural treatments or wildfires to control tree densities, the trend towards increasing acreage on the Kalispell Unit covered by older, slower growing stands would continue. This is particularly an issue as

these older stands are highly susceptible to both disease and wildfire. Timber productivity would likely decrease.

Action Alternative- Direct and Indirect Effects

Silvicultural treatments to be applied under the Action Alternative would remove both live and dead trees, particularly targeting those affected by insect and disease. Healthy and vigorous trees of all species would be favored for retention where they occur. Stand health would improve with the removal of low vigor or diseased trees. Between-tree competition would be reduced allowing residual trees to maintain or accelerate current growth rates.

Silvicultural treatments under the Action Alternative would reduce stand densities and favor more vigorous trees. These healthy trees, when well-spaced, are more likely to be capable of thwarting bark beetle attacks.

Stem decays would decline as healthy, vigorous trees are retained and infected trees are removed.

Silvicultural treatments would remove some overstory western larch infected with dwarf mistletoe and reduce the amount present. The reduction in overstory infected with mistletoe would translate into fewer understory infected and promote the development of western larch in the overstory.

Action Alternative- Cumulative

Timber productivity would increase with silvicultural treatments that favor retention of younger, healthy trees. The acres of forested stands highly susceptible to insect, disease and wildfires would decrease.

Noxious Weeds

Existing Condition

Noxious weed populations are currently found adjacent to existing roads and game trails within the project area. Some populations have spread from established areas along roads into adjacent openings. Weed species identified in field reconnaissance include: Orange hawkweed (*Hieracium aurantiacum*), spotted knapweed (*Centaurea maculosa*), St. Johnswort (*Hypericum perforatum*), Houndstongue (*Cynoglossum officinale*), and oxeye daisy (*Chrysanthemum leucanthemum*).

Environmental Effects to Noxious Weeds

No Action Alternative- Direct and Indirect Effects

Noxious weed seed would continue to spread from existing populations and new populations may be introduced to the project area from recreational use and from uses adjacent to or within state land. Herbicide treatment along existing roads would continue as funding and unit priorities allow. Containment of weed infestations or a reduction in acres infested with weeds may be realized.

No Action Alternative- Cumulative Effects

Noxious weed populations are unpredictable across the project area and Kalispell Unit as a result of the No Action Alternative. With the adoption of ARM 36.11.445 and the implementation of an integrated noxious weed

agreement with Flathead County, a more aggressive approach to noxious weed identification and treatment has occurred than in the past. This ongoing treatment of noxious weeds should limit large increases in noxious weed spread and may reduce the number of acres infested in the future. However, increased recreational uses and a growing Montana population could result in more accidental spreading of noxious weed seed and outbreaks in areas that are currently weed free.

Action Alternative- Direct and Indirect Effects

Timber harvesting and road maintenance could increase the potential for further establishment of noxious weeds due to the exposure of bare mineral soil. Applying integrated weed management techniques within the sale design could reduce the probability of occurrence and spread of noxious weeds. Grass seeding road reconstruction/maintenance and log landings and spot spraying new weed infestations could reduce or prevent establishment of additional populations. Washing logging equipment prior to use would limit the introduction of weed seeds into the forest. Trampling of slash in skid trails and closing roads to motorized use in the project area could limit the potential for soil disturbance and reduce the potential for weed establishment during and after logging. Treating existing weed populations with herbicide spray would reduce current populations or contain the area infested.

Under the Action Alternative, timber harvesting would occur on 430 acres and include 15.7 miles of road reconstruction, maintenance, and temporary construction. Acreage within harvest units and associated with road reconstruction would be at a higher risk for incurring weed establishment and spread due to soil disturbance that may occur from skidding, landing, and heavy equipment use for road reconstruction and site-preparation activities. Trampling of slash in skid trails, grass seeding areas disturbed during road work, and spot herbicide treatments, would reduce current acreage and limit potential risk of further establishment of weed populations.

Action Alternative- Cumulative Effects

In combination with other management and recreational activities on the Kalispell Unit, the Action Alternative would increase the risk of further encroachment of forested sites by noxious weeds. The potential risk would be limited with the use of prevention measures implemented under the county agreement and with the mitigation measures for the Meadow Ridge Project. Actual weed treatments would likely be applied to a more extensive area under the Action Alternative, and have a greater potential for reducing current weed populations within the project area, thereby reducing the noxious weed affected area within the Kalispell Unit.

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Pfister, R.D., B.L. Kovalchik, S.F. Arno, and R.C. Presby. 1977. Forest habitat types of Montana, United States Forest Service., Intermountain Forest and Range Experimental Station, General Technical Report, GTR-INT-34, Ogden, UT.

Attachment C – Soils

Meadow Ridge Timber Sale – Soils Analysis

Analysis Prepared By:
Name: Tony Nelson
Title: Hydrologist, Montana DNRC

Introduction

The following analysis will disclose anticipated effects to soil resources within the Meadow Ridge project area. Direct, secondary, and cumulative effects to soil resources of both the No-Action and Action alternatives will be analyzed.

Issues and Measurement Criteria

Soil Physical Properties
Analysis of soil physical properties addresses the issue that timber harvesting and associated activities may affect soil conditions in the proposed project area through ground-based and cable yarding activities, and through repeated entries to previously harvested areas. Operation of ground-based machinery can displace fertile layers of topsoil, which can lead to a decrease in vegetation growth. Ground-based machinery can also lead to compaction of the upper layers of soil. Compaction decreases pore space in soil, reduces its ability to absorb and retain water, and can increase runoff and overland flow. These conditions can also lead to a decrease in vegetation growth. Surface erosion can also affect vegetation growth and water quality. Sheet and rill erosion can remove fertile surface layers of soil, and also make revegetation difficult.

Measurement Criteria: Soil physical properties will be measured quantitatively by estimating the percentage of harvested ground that would be left in an impacted condition following activity. Estimates will be based on DNRC Soil Monitoring (DNRC, 2011).

Nutrient Cycling
Nutrient cycling, microbial habitat, moisture retention and protection from mineral erosion are provided by coarse and fine woody debris in forested environments (Harmon et al, 1986). Forest management can affect the volumes of fine and coarse woody debris through timber harvesting and result in changes to potentially available nutrients for long-term forest production.

Measurement Criteria: Nutrient cycling will be measured by tons of coarse woody material per acre on harvested sites pre- and post-project.

Slope Stability
Slope stability can be affected by timber management activities by removing stabilizing vegetation, concentrating runoff, or by increasing the soil moisture. The primary risk areas for slope stability problems include, but are not limited to, land types that are prone to soil mass movement, and soils on steep slopes (generally over 60 percent).

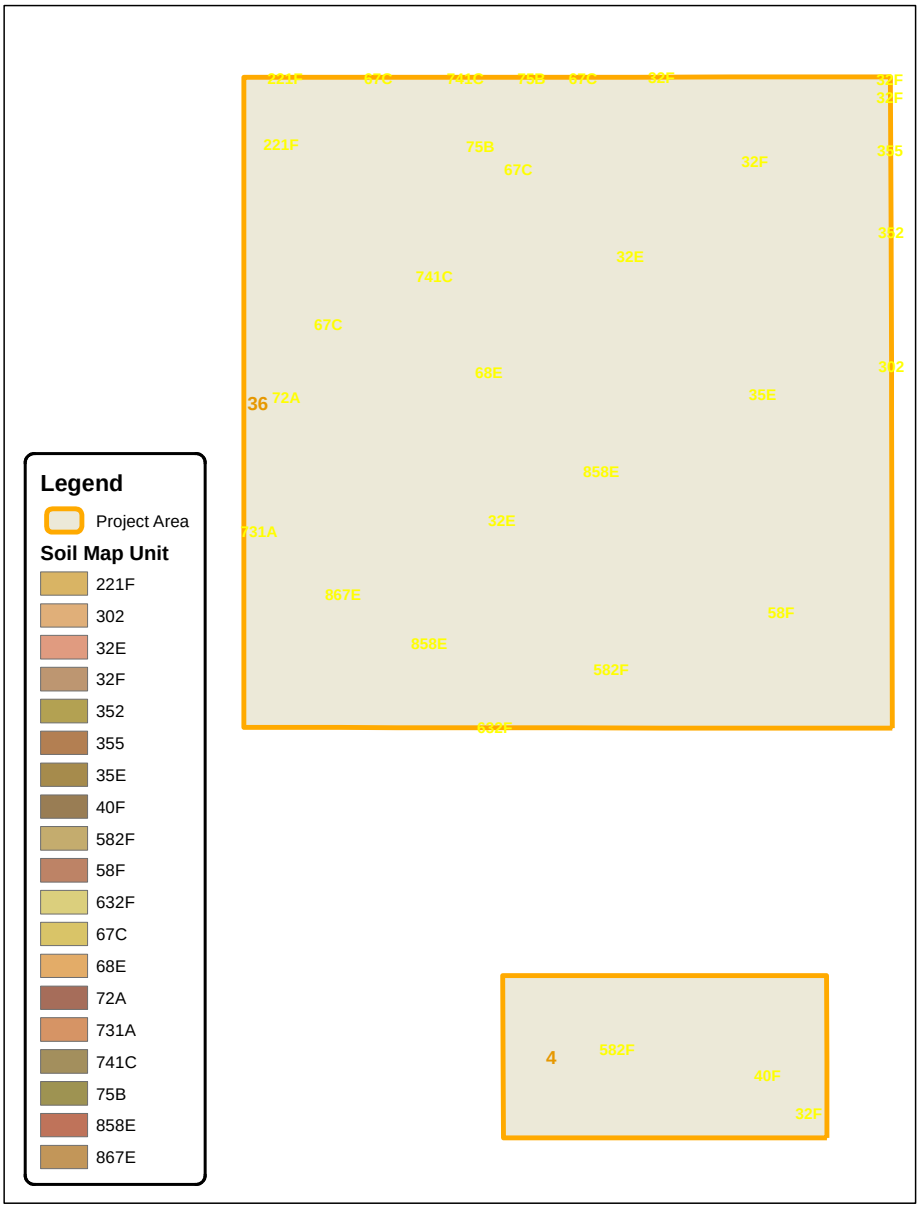
Measurement Criteria: Slope stability risk will be measured based on percentage of slopes steeper than 60% with high risk land types.

Analysis Areas

Direct and Secondary and Cumulative Effects Analysis Area

The analysis area for evaluating direct, secondary and cumulative effects to soil physical properties, nutrient cycling and slope stability will include areas proposed for harvest within the gross project area. Analysis area for existing conditions and slope stability will include DNRC owned land within the Meadow Ridge project area. A map of the Land types in the Meadow Ridge project area is found below in ***Figure S-1***.

Figure S-1 – *Meadow Ridge Landtype Map*



Analysis Methods

Physical Disturbance (Compaction and Displacement)

Impacts to soil physical disturbance will be analyzed by evaluating the current levels of soil disturbance in the proposed project area based on field review and aerial photo review of existing and proposed harvest units. Percent of area affected is determined through pace transects, measurement, aerial photo interpretation, and GIS to determine skid trail spacing and skid trail width. From this, skid trail density and percent of area impacted are determined. Estimated effects of proposed ground-based and cable yarding activities will be assessed based on findings of DNRC soil monitoring (DNRC, 2011). Soil erosion potential will be measured using the K-value as determined by the NRCS (1996). A description of the K-value and its associated interpretations is found in **Table S3**.

Nutrient Cycling

Nutrient cycling will be analyzed by disclosing existing levels of coarse woody debris from transects conducted during field reconnaissance. The method for quantifying the coarse woody debris is described in the *Handbook for Inventorying Downed Woody Material* (Brown, 1974). Potential impacts to nutrient cycling will be assessed by evaluating risks to nutrient pools and long-term site productivity from timber sale contract requirements and mitigation measures.

Slope Stability

Slope stability risk factors will be analyzed by reviewing the Web Soil Survey to identify landtypes listed as high risk for mass movement. Field reconnaissance will also be used to identify any slopes greater than 60 percent as an elevated risk for mass movement.

Existing Conditions

Geology

The landform and parent materials in the project area are generally quartzite and argillite bedrock soils with small areas of glacial till or glacial drift influence. The majority of the bedrock consists of slightly metamorphosed sedimentary rocks formed from sand, silt, clay, and carbonate materials deposited in an ancient shallow sea during the Precambrian period.

Physical Disturbance (Compaction and Displacement)

Soil physical disturbance can be affected through management activities. In the gross project area, DNRC has conducted timber harvesting since the 1970s. Timber sale records dating back to the 1970s indicate that portions of section 36 of the proposed project area has been harvested using a combination of ground-based and cable yarding methods. Ground-based yarding can create soil impacts through displacement and compaction of productive surface layers of soil, mainly on heavily used trails. Existing skid trails are spaced at between 60 and 120 feet apart, and none were identified as erosion or sediment sources. Trails are still apparent, but most are well vegetated and past impacts are beginning to ameliorate from freeze-thaw cycles and root penetration. Based on pace transects of trail spacing, knife penetration tests for compaction, and

ocular estimates of revegetation, approximately 10% of previously ground-skidded harvest units are in an impacted condition in the proposed project area.

Table S3 – Soil Map Unit Description

Map Unit	Description	Acres	Analysis Area %	Landtype Description	Compaction hazard	Erosion Hazard	Displacement Hazard
32E	Mitten gravelly ashy silt loam, 15-35%	91	13%	Mountain slopes	M	L	L
32F	Mitten gravelly ashy silt loam, 35-50%	73	10%	Mountain slopes	M	L	L
35E	Courville gravelly ashy silt loam, 8-30%	79	11%	Moraines	M	L	L
40F	Holloway gravelly ashy silt loam, 35-60%	16	2%	Mountains	M	L	L
58F	Waldbillig gravelly ashy silt loam, moist; 30-50%	61	8%	Mountains	M	L	L
67C	Glaciercreek gravelly ashy silt loam, cool; 0-8%	111	15%	Outwash plains, stream terraces	M	L	H
68E	Upsata gravelly ashy silt loam, 8-30%	20	3%	Outwash plains, stream terraces	M	L	H
72A	Blacklake mucky peat, 0-1%	7	1%	Closed depressions	H	H	H
75B	Tallcreek ashy silt loam, 0-4%	6	1%	Stream terraces	M	H	H
221F	Courville-Rockhill rock outcrop complex, 30-50%	15	2%	Moraines on mountain slopes	M	L	L
582F	Waldbillig-Holloway gravelly ashy silt loam, moist; 30-50%	106	15%	Mountains	M	L	L
731A	Meadowpeak-Firetower silt loam, 0-2%	3	<1%	Flood plains	H	M/H	H
741C	Blackcreek silt loam, 0-8%	19	3%	Flood plains	M	M/H	H
858E	Waldbillig gravelly ashy silt loam, moist; 8-30%	87	12%	Moraines	M	L	L
867E	Glaciercreek gravelly ashy silt loam, cool; 8-30%	28	4%	Stream terraces, outwash plains	M	L	L

Erosion

No areas of soil erosion were identified during field reconnaissance in 2014 and 2016 by a DNRC hydrologist. Upland areas harvested during previous entries were found to be stable, well-vegetated and not actively eroding. Erosion from existing road surfaces has been analyzed in the watershed and hydrology analysis.

Nutrient Cycling
Nutrient cycling was assessed in the proposed project area by completing 8 transects to estimate the current levels of coarse woody debris. These transects were focused on proposed harvest units. The average coarse woody debris is 15.3 tons/acre, with a range of 1.5 to 59.7 tons/acre and a median of 6.2 tons/acre. These results are generally within the recommended range discussed in *Managing Coarse Woody Debris in Forests of the Rocky Mountains* (Graham et. al., 1994) on similar habitat types. Grand fir and Douglas-fir habitat types in Montana are recommended to have a range of 7 to 24 tons/acre to maintain forest productivity.

Slope Stability
Soil types in the project area are primarily gentle to moderately sloped (0-60%) residual soils and glacially derived soils found on hilly terrain. The Web Soil Survey reports the findings in the *Sanders and Parts of Lincoln and Flathead Counties, Montana (MT651)* (NRCS, 1996) soil survey. This survey identified no areas of soils at high risk for mass movements in the project area. No slope failures were identified during reconnaissance in the proposed project area. Because none of the slope stability risk factors are present in any parcel of the proposed project area, slope stability will not be evaluated on this project in the remainder of this analysis. A list of soil map units found in the Meadow Ridge project area and their associated management implications is found in **Table S-3**.

Environmental Effects

No Action Alternative: Direct, Secondary, and Cumulative Effects
Implementation of the no-action alternative would result in no soil resource impacts in the project area. Soil resource condition would remain similar to those described in the existing conditions sections of this environmental assessment.

Action Alternative: Direct, Secondary, and Cumulative Effects

Geology
Direct and Secondary & Cumulative
The geology would remain similar to those described in the existing conditions sections of this environmental assessment.

Physical Disturbance (Compaction and Displacement)
Direct and Secondary
Based on DNRC soil monitoring on soils and sites similar to those found in the project area, direct impacts to soil physical disturbance would be expected on up to 56 of the total 430 acres proposed for harvesting in the proposed project area. Soil monitoring conducted on DNRC lands statewide on similar soils with ground-based machinery had a range of impacts from 0 to 35.5 percent of the acres treated, with an average disturbance rate of 13.3% (DNRC, 2011. These impacts include operations on dry soils in non-winter conditions. Soil monitoring conducted on DNRC lands shows that sites harvested on DNRC lands statewide on similar soils with cable yarding equipment had a range of impacts from 2.3 to 11.4 percent of the acres treated, with an average disturbance rate of 6.2% (DNRC, 2011). As a result, the extent of impacts expected would likely be similar to those reported by DNRC soil monitoring (DNRC, 2011), or approximately 0 to 35.5 percent of ground-based harvested acres, and approximately 2.3 to 11.4 percent of cable harvest acres. The proposal includes 412 acres of ground-based mechanical harvesting and 18 acres of cable yarding.

Ground-based site preparation would be done on tractor units, and prescribed fire may be used for site preparation on portions of cable harvest units. These activities would also generate direct impacts to the soil physical disturbance. Site-preparation disturbance would be intentionally done, and these impacts are considered light and promote reforestation of the site. The combination of these activities would leave approximately 13.0 percent of the proposed harvest units in an impacted condition. This level is below the

range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the *SFLMP*, and well within the 20-percent impacted area established as a level of concern in the *SFLMP (DNRC 1996)*. This level translates to a low risk of low direct and indirect impacts to soil physical disturbance. These impacts would likely persist for 20-40 years, depending on site specific conditions. In addition, BMPs and a combination of mitigation measures would be implemented to limit the area and degree of soil impacts as noted in ARM 36.11.422 and the SFLMP (DNRC, 1996).

Cumulative

Cumulative effects to soil physical disturbance may occur from repeated entries into a forest stand where additional ground is impacted by equipment operations. With this alternative, nearly all of the 430 acres proposed for harvesting have had previous ground-based timber sale operations. Existing skid trails where compaction has begun to ameliorate through freeze-thaw cycles and revegetation would return to a higher level of impact due to this alternative. Additional trails may also be required if existing trails are in undesirable locations. Cumulative effects to soil physical disturbance in these areas not previously managed would be identical to those displayed in the Direct and Indirect Effects section of this analysis. Cumulative impacts to soil physical properties under the Action Alternative would fall below the range analyzed for in the EXPECTED FUTURE CONDITIONS section of the SFLMP and are well within the 20-percent impacted area established as a level of concern in the SFLMP (DNRC, 1996). This level translates to a low risk of low cumulative impacts to soil physical properties. These impacts would likely persist for 20-40 years, depending on site specific conditions.

Erosion

Direct and Secondary

Direct and secondary effects to erosion from the proposed project would include skid trails in ground based harvest areas, cable yarding corridors in cable areas and new roads. In each of these areas, there is a high risk of low impacts to erosion due to exposure of bare soil. Skid trails and cable yarding corridors would present a short-term risk which would decrease once disturbed areas re-vegetate. New roads would represent a longer term risk due to continued exposure of bare soil on road tread areas. Erosion from roads is addressed in the watershed and hydrology portion of the analysis.

Cumulative

Cumulative effects to erosion would be similar to the values reported for soil disturbance. Approximately 13.0% of the proposed harvest units would have exposed soil following activity. These areas of disturbance present a low risk of low impacts to erosion and subsequent sediment delivery due to implementation of all applicable BMPs and mitigations listed in this analysis and in the watershed and hydrology analysis.

Table S4 – Detrimental Soil Disturbance for the Action Alternative

Area of Analysis	Total Area (Acres)	Disturbance Rate (%)	Affected Area (Acres)
Harvest Units (including landings)	430	13.0	56
Roads *	1.0	100.0	1.0

Nutrient Cycling

Direct and Secondary

Direct and indirect effects to nutrient cycling would include an increase in coarse woody debris from the Action Alternative. This would present a low risk of low direct and indirect effects to nutrient cycling. Stands where woody debris levels are low would see an increase in large woody debris as a result of the proposed harvesting. In addition, this alternative would lead to an increase in fine woody material in the form of limbs and tree tops being left after harvest. Through the timber sale contract, approximately 15-20 tons of coarse woody material would be left on the ground following harvesting activities, as well as fine material for nutrient retention.

Cumulative

Risk of cumulative effects to nutrient cycling from nutrient pool loss would be low. This would present a low risk of low cumulative effects to nutrient cycling. This alternative would follow research recommendations found in Graham (1994) for retention of coarse and fine woody debris through contract clauses and site-specific mitigation measures.

Soils Mitigations

- Limit equipment operations to periods when soils are dry (less than 20% oven-dried weight), frozen or snow-covered in order to minimize soil compaction and rutting, and to maintain drainage features. Check soil moisture conditions prior to equipment start-up.
- On ground-based units, the logger and sale administrator would agree to a skidding plan prior to equipment operations. Skid trail planning would identify which existing trails to use and how many additional trails are needed.
- Do not use existing trails if they are located in draw bottoms or other unfavorable locations.
- Grass seeding or other erosion control measures may be required to stabilize some trails.
- Limit ground-based operations to slopes less than 40% unless they can be used without causing excessive displacement or erosion.
- Space cable yarding corridors at least 75 feet apart. Clearing width for corridors to accommodate yarding should not exceed 12 feet.
- Keep skid trails to 20 percent or less of the harvest unit acreage. Provide for surface drainage of all roads and skid trails concurrent with operations.
- Slash disposal: Limit the total of disturbance and scarification to 30-40 percent of harvest units.
- Limit dozer piling to slopes less than 35 percent and limit excavator piling to slopes less than 40 percent unless it can be completed without causing excessive erosion.
- Retain between 15 and 20 tons/acre of woody debris 3-inches in diameter or greater (depending on habitat type) and a feasible majority of fine branches and needles following harvesting operations. On units where whole-tree harvesting is used, implement one of the following mitigations for nutrient cycling: 1) use in-woods processing equipment that leaves fine slash on site; 2) for whole-tree harvesting, return skid slash and evenly distribute within the harvest area; or 3) cut tops from every third bundle of logs so that tops are dispersed as skidding progresses.

Soils References

Brown, J. K. 1974. *Handbook for Inventorying Downed Woody Material*. In: USDA and Forest Service (editors). Ogden, Utah: Intermountain Forest and Range Experiment Station.

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NRCS, 1998. MT651-Soil Survey of Sanders and Parts of Lincoln and Flathead Counties, Montana. United States Department of Agriculture Natural Resources Conservation Service.

Attachment D – Hydrology

Meadow Ridge Timber Sale – Water Resources Analysis

Analysis Prepared By:
Name: Tony Nelson
Title: Hydrologist, Montana DNRC

Introduction

The following analysis will disclose anticipated effects to water resources within the Meadow Ridge project area. Direct, secondary, and cumulative effects to water resources of both the No-Action and Action alternatives will be analyzed.

Issues and Measurement Criteria

The following issues encompass the specific issues and concerns raised through public comment and scoping of the proposed project. For a specific list of individual comments and concerns, please refer to the project file.

Sediment Delivery
Sediment delivery and subsequent water-quality impacts can occur as a result of timber harvesting and related activities, such as road construction and log yarding to landings. Construction of roads, skid trails and landings can generate and transfer substantial amounts of sediment through the removal of vegetation and exposure of bare soil. In addition, removal of vegetation near stream channels reduces the sediment-filtering capacity and may reduce channel stability and the amounts of large woody material. Large woody debris is a very important component of stream dynamics, creating natural sediment traps and energy dissipaters to reduce the velocity and erosive power of stream flows.

Measurement Criteria: Sediment from roads, harvesting activities and vegetative removal will be analyzed qualitatively through data collected during past statewide and DNRC internal BMP field reviews.

Water Yield
Water yield can be affected by timber harvesting and associated activities by affecting the timing, distribution and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removal (*Haupt 1976*), because removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Water yield is further affected because canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt. Water yield impacts are ameliorated as new trees begin to grow and use water. New growth also begins to return snowpack distribution to pre-harvest levels as stands grow. Higher water yields may lead to increases in peak flows and peak-flow duration, which can result in accelerated streambank erosion and sediment deposition. Vegetation removal can also reduce peak flows by changing the timing of snowmelt. Openings will melt earlier in the spring with solar radiation and have less snow available in late spring when temperatures are warm. This effect can reduce the synchronization of snowmelt runoff and lower peak flows.

Measurement criteria: The water yield increase for the project area streams was determined using field review and aerial photo interpretation. Visual inspection of the runoff patterns and stream channel stability within the Meadow Ridge project area were used to assess the impacts of past management to water yield. Aerial photo interpretation was used to determine the extent of past management in these watersheds.

Regulatory Framework

The following plans, rules, and practices have guided this projects planning and/or would be implemented during project activities:

Montana Surface Water Quality Standards

According to ARM 17.30.609 (1)(a), this portion of the Kootenai River drainage including the Pleasant Valley Fisher River, is classified as B-1. Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and minimal increases in turbidity. "Naturally occurring," as defined by ARM 17.30.602 (19), includes conditions or materials present during runoff from developed land where all reasonable land, soil and water conservation practices (commonly called BMPs) have been applied. Reasonable practices include methods, measures or practices that protect present and reasonably anticipated beneficial uses. These practices include but are not limited to structural and non-structural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of activities that may impact the resource.

There are no surface water rights within the proposed project area.

Designated beneficial uses in the proposed project area may include cold water fisheries and recreation on the Pleasant Valley Fisher River. No other beneficial water uses were identified due to a lack of stream channels or lack of delivery to downstream waters.

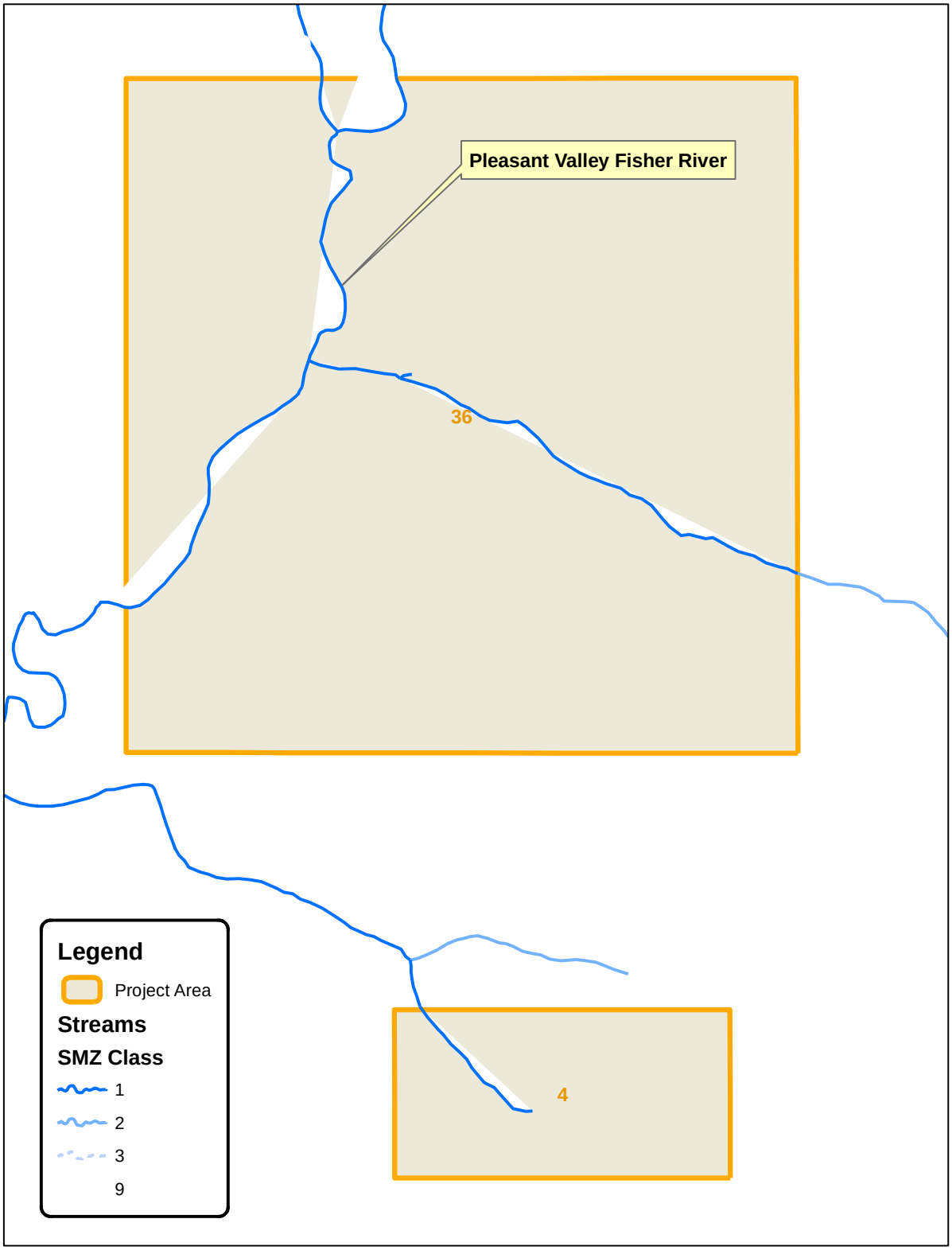
Water Quality Limited Waterbodies

None of the streams within the project area, including the Pleasant Valley Fisher River, are listed in the *2016 Montana's Water Quality Integrated Report (305b)* publication produced by the Montana Department of Environmental Quality (DEQ, 2016). This list is compiled by the Montana Department of Environmental Quality (DEQ) as required by Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR, Part 130).

Montana Streamside Management Zone (SMZ) Law

For a map of the streams and their SMZ classification, please refer to ***Figure H-1***. By the definition in ARM 36.11.312(3), two perennial tributaries to the Pleasant Valley Fisher River, one in section 36 of the proposed project area and one in section 4 are class 1 streams since they flow more than 6 months per year and contribute flow to the Pleasant Valley Fisher River. No fish were identified in either of these streams during field reconnaissance, but due to their perennial connection to a fish-bearing stream, it is possible that these streams serve as rearing habitat for fish. All other drainage features found within the proposed project area did not meet the definition of a stream in ARM 36.11.312(20), and are classified as ephemeral draws and swales with no defined channel.

Figure H-1 – *Meadow Ridge Project Area Steams*


Pleasant Valley Fisher River
36
4
Legend
Project Area
Streams
SMZ Class
1
2
3
9

Analysis Areas

Sediment Delivery
Analysis area for direct, indirect and cumulative effects to sediment delivery will be analyzed on all existing roads in and leading to the proposed project area. Sediment delivery will be analyzed qualitatively where stream crossings exist within the proposed project area using visual inspection and lineal measurement to determine the road surface area delivering to a stream. Additional sites on proposed haul routes located outside the project area will be assessed qualitatively for their potential to affect downstream water.

Water Yield
Direct, indirect and cumulative effects to water yield will be analyzed in the stream systems within the project area. A map of the project area and the streams found within the project area is found in ***Figure H-1***. All existing activities on all ownership and proposed activities related to the Meadow Ridge project will be analyzed using methods described above. These drainages were chosen as an appropriate scale of analysis, and will effectively display the estimated impacts of proposed activities.

Analysis Methods

Where risk is assessed in both sediment-delivery and water-yield analyses, the following definitions apply to the level of risk reported:
- low risk means that impacts are unlikely to result from proposed activities,
- moderate risk means that there is approximately a 50-percent chance of impacts resulting from proposed activities, and
- high risk means that impacts are likely to result from proposed activities.

Where levels or degrees of impacts are assessed in this analysis, the following definitions apply to the degree of impacts reported:
- very low impact means that impacts from proposed activities are unlikely to be measurable or detectable and are not likely to be detrimental to the water resource;
- low impact means that impacts from proposed activities would likely be measurable or detectable, but are not likely to be detrimental to the water resource;
- moderate impact means that impacts from proposed activities would likely be measurable or detectable, and may or may not be detrimental to the water resource;
- high impact means that impacts from proposed activities would likely be measurable or detectable, and are likely to have detrimental impacts to the water resource.

Sediment Delivery
Analysis methods to assess sediment delivery will include qualitative assessments where stream crossings exist within the proposed project area using visual inspection and lineal measurement to determine the road surface area delivering to a stream. Sediment from roads, harvesting activities and vegetative removal will be analyzed qualitatively through data collected during past statewide and DNRC internal BMP field reviews.

Water Yield
Analysis methods to assess water yield increases for the project area streams was determined using field review and aerial photo interpretation. Visual inspection of the runoff patterns and stream channel stability within the Meadow Ridge project area were used to assess the impacts of past management to water yield. All existing activities on all ownership within project area watersheds and proposed activities related to the Meadow Ridge project will be analyzed using methods described above.

Existing Conditions

General Description

The following section will describe the existing conditions within the proposed project area and the analysis areas that are relevant to the issues discussed above in this analysis.

Sediment Delivery

Sediment delivery on this parcel was reviewed by a DNRC hydrologist in 2014 and in 2016. Two stream channels were identified in the project area. Both are perennial class 1 tributaries to the Pleasant Valley Fisher River. One is located in section 36 of the proposed project area and has an approximately 6-foot bankfull width. The stream was classified as a B2/3 channel using a classification system developed by *Rosgen* (*1996*). Channel types rated as "B" are typically in the 2- to 4-percent gradient range, and have a moderate degree of meander (sinuosity). Channel-bed materials in B2/3 types are mainly boulder and cobble. The other is located in section 4 of the proposed project area and has an approximately 1-2' bankfull width. The stream was classified as a B4/5 channel using a classification system developed by *Rosgen* (*1996*). Channel types rated as "B" are typically in the 2- to 4-percent gradient range, and have a moderate degree of meander (sinuosity). Channel-bed materials in B4/5 types are mainly gravel and coarse sand. No areas of unstable or actively down-cut channels were identified during field reconnaissance. Large woody debris was found in adequate supply to support channel form and function. Woody material in a stream provides traps for sediment storage and gradient breaks to reduce erosive energy and work as flow deflectors to reduce bank erosion. No evidence of past SMZ harvesting was found. Based on these findings, no in-channel sources of erosion or deposition were identified in project area stream reaches.

No sediment delivery from the existing road system was identified on any of the proposed haul routes within or leading to the project area. The existing road system in the proposed project area is low to moderate standard native-surfaced road, and most reaches meet applicable best management practices for surface drainage and erosion control. Road surfaces are partially vegetated with grass/forbs and are not actively eroding. Improvements to BMPs at specific sites may be required prior to use. Most road grades are generally under 8%. The road system was constructed to access timber harvesting by the Weyerhauser Timber Company and Montana DNRC during past entries. Most of the road segments in the project area are not causing active erosion or sediment delivery to streams.

Water Yield

No water yield impacts were identified from past activities in and around the proposed project area streams. Past management activities consist of timber management on privately owned industrial holdings and state land. These activities and events have led to reductions in forest canopy cover, and construction of roads.

Following field reconnaissance of these parcels, it was determined that a detailed water yield analysis would not be necessary for this project. The surrounding area has historically had substantial levels of harvest activity, however in the class 1 channels in the proposed project area, there were no impacts apparent as a result of water yield increases. In addition, a majority of the past harvesting in these small drainages occurred approximately 20 years ago, and new trees are actively growing and water use by the forest canopy is moving closer to pre-harvest conditions. No adverse impacts were identified in the Pleasant Valley Fisher River from

water yield increases or in-channel adjustments. All stream channels identified within the proposed project area were stable and showing no signs of impacts from water yield increases. After evaluating the watershed cumulative effects risks along with the current conditions in the Meadow Ridge project area, by ARM 36.11.423, a detailed watershed analysis is not needed in this project area.

Environmental Effects

No Action Alternative: Direct, Secondary, and Cumulative Effects

Sediment Delivery

Direct and Secondary

Under this alternative, no timber harvesting or related activities would occur. Water Quality would continue as described in the existing conditions.

Cumulative

No additional cumulative impacts to water quality would be expected. Sediment delivery sites from roads on the proposed haul routes would remain unchanged, as would the sediment sources described in Existing Conditions.

Water Yield

Direct and Secondary

No increased risk of increases or reductions in annual water yield or ECA would result from this alternative.

Cumulative

No increase in water yield would be associated with this alternative. As vegetation continues toward a fully forested condition, annual water yields would also be expected to gradually decline.

Action Alternative: Direct, Secondary, and Cumulative Effects

Sediment Delivery

Direct and Secondary

There is a low risk of direct or secondary effects to sediment delivery to streams from the timber harvesting activities proposed in the Action Alternative. The SMZ law, Administrative Rules for Forest Management, Riparian Management Zones (RMZ), channel migration zones (CMZ) on fish-bearing Class 1 streams, and applicable BMPs would be applied to all harvesting activities, which would minimize the risk of sediment delivery to draws and streams. The Montana BMP audit process has been used to evaluate the application and effectiveness of forest-management BMPs since 1990; this process has also been used to evaluate the application and effectiveness of the SMZ Law since 1996. During that time, evaluation of ground-based-skidding practices near riparian areas has been rated 92-percent effective, and these same practices have been found effective over 99 percent of the time from 1998 to present (*DNRC 1990 through 2012*). Since 1996, effectiveness of the SMZ width has been rated over 99 percent (*DNRC 1990 through 2012*). As a result, with the application of BMPs and the SMZ Law, proposed activities are expected to have a low risk of low impacts to sediment delivery.

There is a low risk of direct or secondary effects to sediment delivery to streams from the use of existing roads and construction of temporary roads proposed in the Action Alternative. The existing road system meets BMP standards, and no direct sources of sediment were identified. Use of existing brushed-in roads to haul timber would present a low risk of low impacts to sediment delivery due to vegetation loss and improvement of surface drainage features.

There is a moderate risk of low impacts to sediment delivery from construction of approximately 0.33 miles of new road. This risk would be elevated due to exposure of bare soil in order to construct roads. No new stream crossings or stream crossing replacements are proposed with this project. The risk of sediment delivery would remain elevated for 2-3 years after project completion while bare soils are re-vegetated.

Cumulative

Risk of sediment delivery and sediment loading to the Pleasant Valley Fisher River and waters downstream from the proposed project area would be slightly increased from current levels in the short term and below current levels in the long term. Maintenance and improvement of existing erosion control and surface drainage on the existing road system would yield similar erosion rates to current levels. Overall, there is a low risk of short-term low-level increases in sediment loading for about 2-3 years. However, water quality standards are expected to be met and there is a low risk of impacts to beneficial uses.

Water Yield

Direct and Secondary

There is a low risk of very low direct or secondary effects to water yield from harvesting of approximately 430 acres of timber under this alternative within the proposed project area. It is a low risk that this level of harvesting would be sufficient to generate measurable increases in water yield in any streams located within or near the project area or cause channel instability. The stability of channels would be sufficient to handle any anticipated increases without measurable change. As a result, there is a low risk of very low direct or secondary impacts to water yield in project area drainages as a result of the proposed Action Alternative.

Cumulative

There is a low risk of very low cumulative effects to project area drainages and downstream waters in and near the project area as a result of the proposed project. The proposed harvesting is not expected to have any measurable or observable impacts to water yield in the Pleasant Valley Fisher River - Barnum Creek. Therefore potential increases in water yield from harvest activities have a very low risk to affect downstream waters.

Water Resources Mitigations

Hydrologic related resource mitigations that would be implemented with the proposed Action Alternative include:

- implement Riparian Management Zones on all class 1 streams based on site-potential tree heights in the project area
- implement BMPs on all newly constructed roads and improve BMPs on existing roads where needed
- use spot-blading on existing roads to preserve as much of the existing vegetative cover as possible on vegetated road surfaces

Water Resources References

DNRC, 1990-2016. Montana Forestry Best Management Practices Monitoring. Missoula, Montana.

DNRC, 1996. State Forest Land Management Plan. Montana Department of Natural Resources and Conservation. Missoula, Montana.

Farns, P. 1978. Hydrology of Mountain Watersheds, Preliminary Report. Soil Conservation Service. Bozeman, MT.

Haupt, H.F., et al. 1974. *Forest Hydrology Part II Hydrologic Effects of Vegetation Manipulation*. USDA Forest Service, Region 1. Missoula, MT.

Montana Department of Environmental Quality. "Clean Water Act Information Center." 30 January, 2017. < http://deq.mt.gov/Water/WQPB/cwaic>

Rosgen, David L. 1996. *Applied River Morphology.* Wildland Hydrology, Pagosa Springs, CO.

Attachment E – Fisheries

Fisheries Resources Assessment

Assessment Prepared By:

Name: Tony Nelson
Title: Hydrologist, Montana DNRC

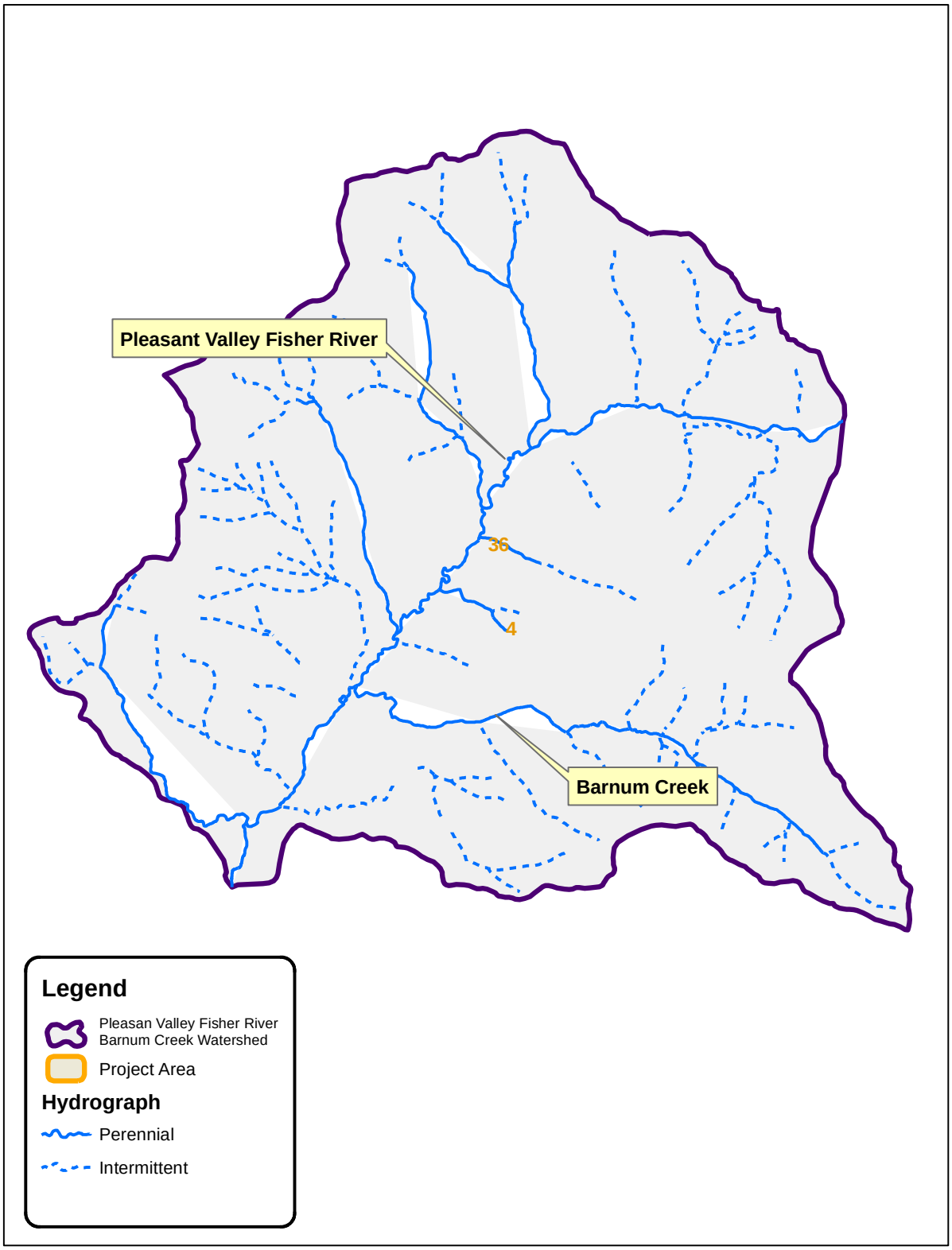
Introduction

The following assessment will disclose anticipated effects to fisheries resources within the Meadow Ridge project area.

Assessment Areas

The assessment area for direct, indirect and cumulative effects will be used to evaluate the existing and potential impacts to fisheries resources associated with the proposed project. The assessment area was chosen because it includes (1) the watershed of known or potential fish-bearing streams and (2) the proposed harvest units and haul routes that could have foreseeable**,** measurable**,** or detectable impacts to those fisheries resources. The assessment area is shown in Figure F1 below.

Figure F1 – Fisheries Assessment Area



Assessment Methods

Methodology to assess the status and potential impacts of the proposal to fish populations will include presence/absence determinations in project area parcels and evaluating risk factors to habitat degradation. The risk factors to habitat degradation were evaluated with a sediment source inventory during preparation of the Meadow Ridge Timber Sale. The inventory included cataloging channel stability, in-channel and out-of-channel sediment sources.

The descriptions of foreseeable adverse impacts to fisheries resources are described in Table F1 – Descriptions of foreseeable adverse impacts. Positive impacts to fisheries resources will also be described, if applicable, using information on impact extent and duration.

Table F1 – Descriptions of foreseeable adverse impacts.

Impact Description	Probability of Impact	Severity of Impact	Duration of Impact
Negligible	The resource impact is not expected to be detectable or measureable	The impact is not expected to be detrimental to the resource	Not applicable
Low	The resource impact is expected to be detectable or measureable	The impact is not expected to be detrimental to the resource	Short- or long-term
Moderate	The resource impact is expected to be detectable or measureable	The impact is expected to be moderately detrimental to the resource	Short- or long-term
High	The resource impact is expected to be detectable or measureable	The impact is expected to be highly detrimental to the resource	Short- or long-term

Cumulative impacts are those collective impacts on the human environment of the proposed action when considered in conjunction with other past, present, and future actions related to the proposed action by location or generic type (75-1-220, MCA). The potential cumulative impacts to fisheries resources in the assessment area(s) are determined by assessing the collective anticipated direct and indirect impacts, other related existing actions, and future actions affecting the fisheries resources.

Issues

For the purposes of this environmental assessment, issues will be considered actual or perceived effects, risks, or hazards as a result of the proposed alternatives. Issues, in respect to this environmental assessment, are not specifically defined by either the Montana Environmental Policy Act or the Council on Environmental Quality.

Fisheries resource issues raised internally include: the proposed actions may adversely affect fisheries habitat features, including channel forms, stream temperature and connectivity.

Regulatory Framework

The US Fish and Wildlife Service has listed bull trout as 'threatened' under the Endangered Species Act. Both bull trout and westslope cutthroat trout are listed as S2 Montana Animal Species of Concern. Species classified as S2 are considered to be at risk due to very limited and/or potentially declining population numbers, range, and/or habitat, making the species vulnerable to global extinction or extirpation in the state (Montana Fish, Wildlife and Parks, Montana Natural Heritage Program, and Montana Chapter American Fisheries Society Rankings). DNRC has also identified bull trout and westslope cutthroat trout as sensitive species (ARM 36.11.436).

DNRC is a cooperator and signatory to the following relevant agreements: Restoration Plan for Bull Trout in the Clark Fork River Basin and the Kootenai River Basin, Montana (2000), Memorandum of Understanding (2005) for the Swan Valley Bull Trout Work Group, and Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana (2007). All 3 agreements contain land management conservation strategies or action items utilized by DNRC as decision-making tools.

Fisheries-specific forest management ARMs (36.11.425 and 36.11.427), the SMZ Law and rules, and other site-specific prescriptions would be implemented as part of any action alternative.

All waterbodies contained in the fisheries analysis area(s) are classified as B-1 in the Montana Surface Water Quality Standards (ARM 17.30.608[b][i]). The B-1 classification is for multiple beneficial-use waters, including the growth and propagation of cold-water fisheries and associated aquatic life. Among other criteria for B-1 waters, a 1-degree Fahrenheit maximum increase above naturally occurring water temperature is allowed within the range of 32 to 66 degrees Fahrenheit (0 to 18.9 degrees Celsius), and no increases are allowed above naturally occurring concentrations of sediment or suspended sediment that will harm or prove detrimental to fish or wildlife. In regard to sediment, naturally occurring includes conditions or materials present from runoff or percolation from developed land where all reasonable land, soil, and water conservation practices have been applied (ARM 17.30.603[19]). Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses (ARM 17.30.603[24]). The State has adopted BMPs through its Nonpoint Source Management Plan as the principle means of controlling nonpoint source pollution from silvicultural activities.

Existing Conditions

Pleasant Valley Fisher River – Barnum Creek Assessment Area

The entire Pleasant Valley Fisher River – Barnum Creek watershed defines the boundary of this assessment area. The proposed activities that may affect fisheries resources in the Pleasant Valley Fisher River – Barnum Creek assessment area are: upland and RMZ timber harvest; forest road construction, reclamation and maintenance; and forest road utilization for timber hauling and equipment transportation. The fisheries resource variables potentially affected by the proposed actions are channel forms, sediment, flow regime, stream shading, stream temperature, and connectivity.

Native fish species present or assumed present in this portion of the Pleasant Valley Fisher River include: Columbia Basin Redband Trout, Largescale Sucker, Longnose Dace, Longnose Sucker, Northern Pike Minnow, Redside Shiner, Sculpin and Torrent Sculpin. Non-native species present or assumed present include: eastern brook trout and rainbow trout. None of these species is listed as threatened or sensitive by the USFWS.

Channel forms comprise the primary spatial component of fisheries habitat and include the frequency and volume of different slow and fast water features. Stream temperature is the primary thermal component of fisheries habitat and typically includes watershed-specific seasonal and daily fluctuations. Although channel forms and stream temperature are a function of numerous environmental processes, the variables of sediment, flow regime, woody debris and stream shading are major contributors that are also potentially affected by the proposed actions. Furthermore, the ranges of conditions of all of these variables throughout a watershed are highly varied, and the mechanisms by which they are naturally affected are also numerous and complex. For the purposes of this environmental assessment, potentially measureable or detectable effect mechanisms to these variables will be used to evaluate existing conditions and the foreseeable effects of the proposed actions. Site-specific surveys within project area lands serve as a resource subsample to extrapolate foreseeable effects across the assessment area.

Road-stream crossings and roads adjacent to stream channels (both perennial and intermittent stream channels) may be major sources of existing direct and indirect effects to the sediment component of fisheries habitats. Five road-stream crossings occur in the assessment area on DNRC-managed land. Road-stream crossing density per square mile is 2.2 in the assessment area on DNRC-managed land. The length of all roads within 300 feet of all streams is 51.6 miles in the assessment area, and 1.5 miles in the Meadow Ridge project area. The density of roads within 300 feet of any stream is 0.8 miles per square mile in the assessment area, 1.3 miles per square mile in the Meadow Ridge project area. No direct sediment delivery was observed during field reconnaissance from roads located adjacent to streams. Sediment delivery is analyzed in the watershed and hydrology portion of the analysis. While the precise level and extent of impact from each individual road-stream crossing or adjacent road is unknown, the expected existing direct and indirect impact to sediment from road sources is moderate in the assessment area due to proximity of roads to fish-bearing streams.

Flow regime components include total annual water yield and peak seasonal flow timing, duration and magnitude. In addition to the physical geography of a watershed, this variable is also greatly affected by both nature disturbances and land management activities. The Water Resources analysis indicates that the existing condition in the assessment area is expected to be within the historic range of variability.

Riparian zone vegetation heavily influences the delivery and in-channel frequency of woody debris, a major component of channel forms. The riparian zone is also a major regulator (shading) of stream temperature, since direct solar radiation is an important driver of stream thermal regimes, especially during peak seasonal periods. Riparian vegetation along project area streams is mainly brush and grass/forbs with an overstory of mature trees. The expected direct and indirect impact to stream shading is low in the assessment area.

While the level of impact from each affected riparian zone is unknown, the expected existing direct and indirect impact to both woody debris and stream temperature is low in the assessment area.

No existing impacts to fisheries connectivity were found in the proposed project area. None of the streams in the project area are confirmed to be fish-bearing. Due to connectivity to fish-bearing streams, it is assumed that these streams may be fish-bearing, however no fish were identified during field reconnaissance. None of these structures were evaluated for fish passage due to the absence of HCP-covered fish species.

Other existing impacts to fisheries resources in each of the analysis areas include: high impacts to native fish species through displacement, disease, and hybridization by nonnative species; road-stream crossings that likely affect habitat connectivity; grazing impacts that may exacerbate in-stream sedimentation, adverse effects to riparian vegetation, and nutrient inputs; recreational fishing pressures; stream dewatering for agricultural or other purposes; and off-road vehicle impacts. (Past potential effects from forest management activities performed on all land ownerships are included in the assessment of existing direct and indirect effects.) The combination of direct and indirect effects and other existing impacts are expected to have an existing moderate cumulative impact to fisheries resources in the assessment area.

Fisheries Mitigations

Fisheries related resource mitigations that would be implemented with the proposed Action Alternative include:

Applying all applicable Forestry BMPs (including the SMZ Law and Rules) and Forest Management Administrative Rules for fisheries, soils, and wetland riparian management zones (ARMs 36.11.425 and 36.11.426)

Environmental Effects

The environmental effects section will compare the existing conditions to the anticipated effects of the proposed No-Action and Action Alternatives to determine the foreseeable impacts to associated fisheries resources.

Pleasant Valley Fisher River – Barnum Creek Assessment Area

No Action Alternative: Direct, Indirect, and Cumulative Effects
As a result of implementing the No-Action Alternative, no additional direct or indirect effects to fisheries resources would be expected to occur within the assessment area beyond those described in the Existing Conditions.

Future-related actions considered part of cumulative impacts include other forest management practices; continued high impacts to native fish species by nonnative species; a stable to declining number of road-stream crossings that affect habitat connectivity; continued grazing impacts; stable to increasing recreational fishing pressures; ongoing stream dewatering for agricultural or other purposes; and ongoing off-road vehicle impacts. Open, public roads that intersect the analysis areas will continue to be utilized year-round for forest management, recreation and other purposes. Consequently, foreseeable cumulative impacts to fisheries resources are expected to be similar to those described in Existing Conditions.

Action Alternative: Direct, Indirect, and Cumulative Effects
The proposed actions and affected fisheries resources in each analysis area are broadly described in Chapter 2 of this analysis. Project-specific BMPs and road maintenance would be applied to all segments of the haul routes through the assessment area (see Water Resources analysis). All impact descriptions are short-term unless otherwise noted.

Increased truck traffic can accelerate the mobilization and erosion of roadbed material at road-stream crossings and roads located adjacent to streams. However, through the implementation of project-specific BMPs and road maintenance, the associated road sites would be expected to deliver most mobilized sediment away from the stream and road prism and filter eroded material through roadside vegetation. The number of road-stream crossings intersecting the haul route in the assessment area is five. The assessment area has an existing road-stream crossing density of 0.8 sites per square mile, and the Action Alternative does not propose additional road-stream crossings in the assessment area. The length of roads that would be used within 300 feet of all streams is 1.5 miles within the proposed project area. Although project-specific BMPs and road maintenance would be expected to substantially offset the risk of increased sediment delivery due to project-specific vehicle traffic, moderate impacts to sediment are expected in the assessment area.

The proposed Action Alternative proposes to construct an additional 0.33 miles of new road. None of this proposed new construction would be within 300 feet of a stream, and would present a low risk of increased sediment delivery to a stream.

Upland harvest on sites with risk of erosion may mobilize material that could be delivered to adjacent stream channels; however, the Water Resources analysis indicates that the anticipated impacts from this action are low. This assessment takes into consideration the implementation of the SMZ Law and Rules and supplemental ARMs for Forest Management on high risk of erosion sites.

As described in the Water Resources analysis, the levels of proposed timber harvest is not expected to lead to measureable increases in water yield or consequent changes in flow regime.

Riparian harvest of 50 percent of merchantable trees between 50 and 100 feet away from fish-bearing and non-fish-bearing perennial streams would occur on approximately 3 acres in the assessment area. [No riparian harvest would occur within 0 to 50 feet of any potentially fish-bearing and non-fish-bearing perennial streams.] An analysis of this same riparian harvest prescription in the Environmental Impact Statement for the Forested State Trust Lands Habitat Conservation Plan indicates a low risk of impacts to woody debris and stream shading (and stream temperatures affected by direct solar radiation). Due to the very limited magnitude and extent of this management action, low impact to woody debris and stream shading is expected in the assessment area.

Due to the potential effects to riparian shading, a consequent low impact to stream temperature is also expected in the assessment area.

As part of the consideration of cumulative effects, all direct, indirect and other related impacts described in the Existing Conditions and Environmental Effects for the No-Action Alternative would be expected to continue. Additionally, low direct and indirect impacts may occur to channel forms, and low direct and indirect impacts may occur to stream temperature as a result of implementing the proposed actions. Considering all of these impacts collectively, low cumulative impacts to fisheries resources are expected in the assessment area.

Fisheries References

DNRC, 1996. State Forest Land Management Plan Final Environmental Impact Statement. Montana Department of Natural Resources and Conservation, Forest Management Bureau. Missoula, MT.

MDEQ, 2007. Montana Nonpoint Source Management Plan. Montana Department of Environmental Quality, Water Quality Planning Bureau, Watershed Protection Section. Helena, MT. 136 pages.

MRIS, 2016 Montana Fisheries Information System. Fisheries database managed by Montana Fish, Wildlife and Parks, Information Services Division, Helena, MT. http://fwp.mt.gov/fishing/mfish/

USFWS and DNRC. 2010. Montana Department of Natural Resources and Conservation Forested Trust Lands Habitat Conservation Plan, Final Environmental Impact Statement, Volumes I and II. U.S. Department of Interior, Fish and Wildlife Service, Region 6, Denver, Colorado, and Montana Department of Natural Resources and Conservation, Missoula, MT. September 2010.

Attachment F - Wildlife

Meadow Ridge Timber Sale – Wildlife Analysis

Analysis Prepared By:
Name: Leah Breidinger
Title: Wildlife Biologist, Montana DNRC

Introduction

The following analysis will disclose the anticipated direct, secondary, and cumulative effects to wildlife associated with the No-Action and Action alternatives.

Issues

- Mature forest cover and connectivity. The proposed activities could decrease mature forested cover, which could reduce habitat connectivity and suitability for wildlife species associated with mature forests.
- Old-growth forests. The proposed activities could affect wildlife species associated with old-growth forests by reducing habitat availability and increasing fragmentation.
- Canada lynx. The proposed activities could reduce landscape connectivity and the availability of suitable Canada lynx habitat, reducing the capacity of the area to support Canada lynx.
- Fishers. The proposed activities could reduce the availability and connectivity of suitable fisher habitat and increase human access, which could reduce fisher habitat suitability and increase trapping mortality.
- Flammulated owls. The proposed activities could alter the structure of flammulated owl preferred habitat, which could reduce habitat suitability for flammulated owls.
- Pileated woodpeckers. The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for pileated woodpeckers.

Regulatory Framework

The following plans, rules, and practices have guided this project's planning and/or would be implemented during project activities: *DNRC Forest Management Rules, DNRC Forested Trust Lands Final Environmental Impact Statement and Habitat Conservation Plan (USFWS and DNRC 2010), the Endangered Species Act, the Migratory Bird Treaty Act,* and the *Bald and Golden Eagle Protection Act.*

Analysis Areas

Direct and Secondary Effects Analysis Area
The direct and secondary effects of the proposed activities on all species/issues were analyzed within the Project Area (*TABLE WI-1, FIGURE WI-1*).

Cumulative Effects Analysis Areas

The cumulative effects of the proposed activities on all species/issues were analyzed at a broad surrounding landscape scale that varies according to the issue or wildlife species being discussed. Cumulative effects analysis areas are named according to the size of the area and are summarized in *TABLE WI-1* and *FIGURE WI-1*. Cumulative effects analysis areas (CEAAs) include the Project Area as well as lands managed by other agencies and private landowners. The Medium and Large CEAAs are managed primarily by Weyerhaeuser with 88.8% and 72.2% of the Medium and Large CEAAs, respectively, managed by Weyerhaeuser. The Pleasant Valley Fisher River divides the Large CEAA, with USFS lands located north of the river. The majority of both analysis areas are managed for timber production, which the exception of some private lands that are located along the Pleasant Valley Fisher River. The elevation of the CEAAs ranges from 3,400 to 6,500 feet. Detailed descriptions of each analysis area are located in the affected environment section for each issue or species evaluated (e.g., pileated woodpecker etc.).

Table WI-1– Descriptions of the Project Area and cumulative effects analysis areas.

Analysis Area Name	Description	Total Acres	Issues/Species Analyzed
Project Area	DNRC managed lands in Section 36 T28N R27.5W and Section 4 T27N R27W	722	Direct & secondary effects for all issues/species
Medium CEAA	The Project Area and surrounding sections; defined by streams, ridgelines, and topographic features	7,464	mature forest cover & connectivity, old-growth forests, pileated woodpeckers, flammulated owls,
Large CEAA	Central portions of the Pleasant Valley Fisher River – Barnum Creek Subwatershed	27,682	Canada lynx, fishers

Analysis Methods

Analysis methods are based on the DNRC State Forest Land Management Plan, which is designed to promote biodiversity. The primary basis for this analysis includes information obtained by: field visits, review of scientific literature, Montana Natural Heritage Program (MNHP) data queries, DNRC Stand Level Inventory (SLI) data analysis, aerial photograph analysis, and consultation with professionals. The coarse-filter wildlife analysis section includes analyses of the direct, secondary, and cumulative effects of the proposed alternatives on old-growth forest, connectivity of mature forest habitats, and snags and coarse woody debris.

In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species federally listed under the Endangered Species Act, species listed as sensitive by DNRC, and species managed as big game by the Montana Department of Fish Wildlife and Parks (DFWP).

Cumulative effects analyses account for known past and current activities, as well as planned future agency actions. Timber sales that occurred on other ownerships are accounted for in analyses of aerial photographs and DNRC is currently unaware of any proposed or ongoing projects on other ownerships. Recent DNRC timber sale projects (≤10 years) that could contribute to cumulative effects are summarized in the following table.

Table WI-2 – Recent projects and known proposed projects that could contribute to cumulative effects and the number of harvested acres that occur in each analysis area. Values in parentheses indicate the percentage (%) of area the respective lands represent of the each analysis area listed in the table.

Sale Name	Agency	Harvest Year	Project Area	Medium CEAA	Large CEAA
Meadow Ridge	DNRC	Proposed (~2017-2020)	430 (59.5%)	430 (5.8%)	430 (1.6%)
Lang Creek	DNRC	2004-2006	0	0	103 (0.4)
Total	-	-	430 (59.5%)	430 (5.8%)	533 (1.9%)

Coarse Filter Wildlife Analysis

MATURE FOREST COVER AND CONNECTIVITY

Issue
The proposed activities could decrease mature forested cover, which could reduce habitat connectivity and suitability for wildlife species associated with mature forests.

Introduction
Mature forests characterized by large-diameter trees and dense canopy cover provide many wildlife species with food, shelter, breeding sites, and travel corridors. Historically, the spatial configuration of mature forested habitat in the western United States was shaped by natural disturbance, primarily wildfire, blowdown, and pest outbreaks. These events resulted in a mosaic-like spatial configuration of forest patches varying in age, species composition, and development. Spatial configuration, including patch size and connectivity of forested habitat, is important for many wildlife species. Patch size may affect the distribution of wildlife species that are attracted to, or avoid forest edges. Additionally, connectivity of mature forested habitat may facilitate movements of wildlife species that avoid openings in canopy cover. For example, discontinuous mature forested habitat would negatively affect movements of fisher, which avoid large openings in canopy cover. Timber harvest, like wildfire and blowdown, is a disturbance event that often creates open patches of young, early-successional habitats. Forest management considerations for wildlife species dependent on mature forested habitat include providing well-connected patches of habitat with ≥40% canopy cover.

Analysis Area
The analysis area for direct and secondary effects is the Project Area and the analysis area for cumulative effects is the 7,464-acre Medium CEAA as described in *TABLE W-1* and depicted in *FIGURE W-1*. The Medium CEAA is defined by geographic features and provides a reasonable analysis area to assess the impact of the proposed activities on wildlife species in the vicinity of the Project Area.

Measurement Criteria
Factors considered in the analysis include: 1) the degree of timber harvesting, 2) availability and patch size of mature forested habitat (≥40% canopy cover, trees >9 inches dbh average), 3) open and restricted road density, and 4) the availability of potential travel corridors. Mature forested habitat is defined here and in the remainder of the document as forest stands with ≥40% canopy cover comprised primarily of trees that are on average >9 inches dbh. Forested stands containing trees of at least this size and density were considered adequate for providing minimal conditions necessary to facilitate movements of wildlife species that benefit from well-connected mature forest conditions.

Affected Environment
The Project Area currently contains approximately 526 acres of mature stands composed primarily of mixed western larch and Douglas-fir stands with some ponderosa pine and lodgepole pine stands located on south facing slopes and along the Pleasant Valley Fisher River (*TABLE WI-3, FIGURE WI-2*). This habitat is continuous, thus connectivity of mature forests for wildlife is high across the Project Area. The remaining acres

consist primarily of small-diameter lodgepole pine stands that were previously harvested. The Project Area does not occur in any particular area of documented importance for habitat connectivity; however, the Pleasant Valley Fisher River flows through the parcel, which may provide a connectivity corridor for wildlife. Open roads that access the west side of Meadow Ridge and Weyerhaeuser Lands are present in the Project Area and open road density is high at 3.7 miles/square mile, which may influence connectivity for wildlife that avoids roads.

The Medium CEAA consists primarily of Weyerhaeuser lands and contains a low amount of mature forested habitat (*TABLE WI-3*). The largest patch is located in the Project Area with small patches scattered along ridgelines and creeks. Overall, connectivity of mature forested habitat is low (*FIGURE WI-2*). However, larger animals are likely able to access large patches of mature forest located on USFS lands via Chief, Marl and Barnum creeks. Open road density is high in the Medium CEAA at 3.2 miles/square mile, likely reducing connectivity for wildlife species that avoid roads.

Table WI-3– Average patch size and acreage of mature forested habitat (≥40% canopy cover, >9 inches dbh) pre- and post-harvest in the Project Area and Medium CEAA for the Meadow Ridge Timber Sale. Percent of the total corresponding analysis area is in parentheses.

Mature Forest Attribute	Project Area		Medium CEAA	
	Existing	Post-Harvest	Existing	Post-Harvest
Acres of mature forest	526 (73.5%)	335 (46.4%)	1,406 (19.6%)	1,215 (16.3%)
Average patch size (acres)	175	102	70	58
Number of patches	3	4	21	22

Environmental Effects – Mature Forest Cover and Connectivity

No Action Alternative: Direct, Secondary, and Cumulative Effects

None of the proposed forest management activities would occur on DNRC lands. In the short-term, no changes to the amount, quality, or spatial arrangement of mature forested habitat would occur. In the long-term and in the absence of natural disturbance, the availability and connectivity of mature forested wildlife habitat may increase as stands age.

Action Alternative: Direct and Secondary Effects

The proposed activities would occur in 418 (79.5%) of the 526 acres of mature stands available in the Project Area, some of which would continue providing mature forested habitat, albeit at a reduced stand density (*TABLE WI-3, FIGURE WI-2*). Approximately 157 acres of stands treated with old-growth restoration and maintenance cuts would retain 55-65% mature canopy cover post-harvest. The remaining 191 acres would be treated with a seed tree cut and would retain 10-15% mature canopy cover post-harvest. Approximately 3 acres of riparian habitat associated with stream SMZs in the Project Area would be harvested, but vegetation retention measures would apply and canopy cover in these areas would retain >40% canopy cover. Overall, connectivity of upland mature canopy forest within the Project Area would be moderately reduced and one patch of mature forest in the northwest corner of Section 36 would become disconnected from other mature stands. However, riparian habitat in the vicinity of the Pleasant Valley Fisher River would not be affected and a 300-foot wide travel corridor would remain along an unnamed tributary to the Pleasant Valley Fisher River in Section 36. Connectivity would not change in Section 4 since seed tree harvest units are not planned for this portion of the Project Area. Approximately 0.2 miles of road restricted to public access with a kelly hump would be constructed, reducing connectivity for some wildlife species. However, all roads in Section 36 would be closed to the public with a gate and kelly humps, increasing security and connectivity of mature forested habitat for wildlife in this area. Thus, since: 1) the abundance of mature forested habitat would decrease by 191 acres (36.3% of existing mature forest); 2) mature forest fragmentation would increase moderately (*TABLE WI-3*); and 3) 0.2 miles of new road would be constructed, but all roads in the Project Area would be closed to

the public post-harvest; moderate adverse direct or secondary effects to mature forested habitat abundance, suitability, or connectivity would be anticipated as a result of the Action Alternative.

Action Alternative: Cumulative Effects
The proposed activities would affect 418 acres of the 1,406 acres (29.7%) of mature forested habitat available in the Medium CEAA. Post-harvest, 191 of these acres would not provide mature forested habitat for wildlife, causing average patch size to decrease (*TABLE WI-3, FIGURE WI-2*). Reductions in the availability of suitable mature forested habitat would be additive to harvest activities that are proposed or ongoing in the Medium CEAA, although DNRC is unaware of any projects at this time. Approximately 3 acres of riparian habitat associated with stream SMZs in the Section 4 would be harvested, but retention measures would apply and affected areas would retain >40% canopy cover. Overall, connectivity of upland mature forest within the Medium CEAA would be minimally affected due to the current low amounts of mature forested habitat on surrounding lands. Travel along the Pleasant Valley Fisher River and up the unnamed tributary in Section 36 would remain feasible due to the retention of a travel corridor. Approximately 0.3 miles of road would be constructed in Section 4, reducing connectivity for some wildlife species. A kelly hump would be located where the road enters state lands, restricting public access on 0.2 miles of the new road. Additionally, all roads in Section 36 of the Project Area would be closed to the public. Thus, since: 1) the abundance of mature forested habitat in the Medium CEAA would decrease by 191 acres (8.4% of existing mature forest); 2) mature forest fragmentation would increase (*TABLE WI-3*); 3) 0.3 miles of new road would be constructed and 0.2 of these miles would have restricted access; and 4) all roads in Section 36 would be closed to the public; minor adverse cumulative effects to mature forested habitat abundance, suitability, or connectivity would be anticipated as a result of the Action Alternative.

OLD-GROWTH FORESTS

Issue
The proposed activities could affect wildlife species associated with old-growth forests by reducing habitat availability and increasing fragmentation.

Introduction
Old-growth forests are an important component of biological diversity. Old-growth forest stands typically contain various combinations of large old trees, abundant snags and downed logs, and multiple canopy layers, which are typically not found in young forests. These attributes provide structures used by a diversity of wildlife species. The diversity of species and the complexity of interactions between them can be different than in earlier successional stages (*Warren 1990*). Of the 48 old-growth associated species occurring in the Northern Rockies, about 60% may require stands larger than 80 acres (*Harger 1978*). Smaller patches may be unsuitable for wildlife species with large home ranges. Additionally, small, less-mobile species may be at greater risk of local extinction in small patches/habitat islands. Timber harvest can affect the size, availability, and spatial juxtaposition of old-growth stands.

Analysis Area
The analysis area for direct and secondary effects is the Project Area and the analysis area for cumulative effects is the 7,464-acre Medium CEAA as described in *TABLE W-1* and depicted in *FIGURE W-1*. The Medium CEAA is defined by geographic features and provides a reasonable analysis area to assess the impact of the proposed activities on wildlife species in the vicinity of the Project Area.

Measurement Criteria
Old-growth forest stands were identified as described in the Vegetation Analysis. Factors considered in the analysis include: 1) the level of harvesting, 2) the abundance of old-growth, and 3) the abundance of patches >80 acres.

Affected Environment

The Project Area contains approximately 273 acres (37.8% of Project Area) of stands meeting the definition of old-growth (*Green et al. 1992*). Old-growth stands in the Project Area average 68 acres (n=4, patch size: 22, 31, 79, 141 acres). All forest stands in Section 4 are considered old-growth. In Section 36, two of tree old-growth stands share portions of their boundaries with mature, dense forests with ≥40% canopy cover and an average tree diameter of >9 inches dbh (*FIGURE WI-2*).

The Medium CEAA contains 273 acres (3.7% of Medium CEAA) of old-growth stands on DNRC-managed lands. The availability of old-growth in the Medium CEAA is likely low considering that the majority (88.8%) of the area is managed by Weyerhaeuser for timber production and old-growth is most likely to be found in stream bottoms where there are restrictions on timber harvesting. On non-DNRC lands in the Medium CEAA, there are approximately 934 acres of mature forested habitat, some of which may be old-growth. Considering that open road density is high at 3.2 miles per square mile, old-growth attributes such as snags have likely been removed in high road density areas.

Environmental Effects – Old-growth Forests

No Action Alternative: Direct, Secondary, and Cumulative Effects

No changes to the amounts, quality, or spatial arrangement of old-growth would occur on DNRC lands under this Alternative. Thus, no direct, secondary, or cumulative effects associated with the abundance or fragmentation of old-growth forests would be anticipated as a result of the No-Action Alternative.

Action Alternative: Direct and Secondary Effects

Approximately 163 acres (59.7%) of the 273 acres of old-growth forest in the Project Area would be affected by the proposed activities. These acres would be treated with an old-growth maintenance and restoration treatments in which ponderosa pine old-growth characteristics would be emphasized in pine stands and vigor would be improved in western larch stands. Overall, old-growth structural attributes would be maintained in these stands, and they would continue to exceed the minimum threshold old-growth definitions described by Green et al. (*1992*) (see VEGETATION ANALYSIS). Logging would alter some structural attributes of these old-growth stands and could adversely affect some old-growth-associated species, particularly those preferring dense forest stands; however the sustainability of the stands treated using maintenance treatments would be enhanced for the next several decades. Patch size would not change. Thus, since 1) the availability of old-growth would not change; 2) stand density would decrease on 163 acres (59.7% of existing old-growth stands), which may affect wildlife species that prefer dense old-growth stands; and 3) the abundance of old-growth patches >80 acres would not change; minor adverse direct and secondary effects associated with the abundance or fragmentation of old-growth forests would be anticipated as a result of the Action Alternative.

Action Alternative: Cumulative Effects

Approximately 163 acres of the potential old-growth habitat in the Medium CEAA would be affected by the proposed activities (13.5% of the 1,207 acres of old-growth and mature stands). All of these acres would continue providing old-growth habitat post-harvest, albeit at a reduced stand density. Patch size would not change and the availability of large old-growth patches would not change. Changes in structural attributes of old-growth would be additive to ongoing forest management activities in the Medium CEAA, although DNRC is not aware of any projects at this time. Thus, since: 1) old-growth availability would not change; 2) stand density would decrease on 163 acres, which may affect wildlife species that prefer dense old-growth stands; and 3) the abundance of patches >80 acres would not be affected; minor adverse cumulative effects associated with the abundance or fragmentation of old-growth forests would be anticipated as a result of the Action Alternative.

Fine Filter Wildlife Analysis

In the fine-filter analysis, individual species of concern are evaluated. These species include those listed as threatened or endangered under the Endangered Species Act of 1973, species listed as sensitive by DNRC, and animals managed as big game by Montana DFWP. *TABLE WI-4* –provides an analysis of the anticipated effects for each species.

Table WI-4 –Anticipated Effects of the Meadow Ridge Timber Sale on wildlife species.

Species/Habitat	[Y/N] Potential Impacts and Mitigation Measures N = Not Present or No Impact is Likely to Occur Y = Impacts May Occur (Explain Below)
Threatened and Endangered Species	
Grizzly bear *(Ursus arctos)* Habitat: Recovery areas, security from human activity	[**N**] The Project Area is located outside of areas commonly occupied by grizzly bears and outside of recovery zone habitat and non-recovery occupied habitat (*USFWS 1993, Wittinger 2002*).
Canada lynx (*Felix lynx)* Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zone	[**Y**] ***Detailed Analysis Provided Below*.** The Project Area contains approximately 408 acres of suitable lynx habitat.
Sensitive Species	
Bald eagle *(Haliaeetus leucocephalus)* Habitat: Late-successional forest < 1 mile from open water	[**N**] No bald eagle nests occur within 2.5 miles of the Project Area. However, if nesting pairs are documented in the vicinity of the Project Area, timing restrictions and additional mitigations would apply.
Black-backed woodpecker *(Picoides arcticus)* Habitat: Mature to old burned or beetle-infested forest	[**N**] No recently (<5 years) burned areas occur within 0.25 miles of the Project Area. Thus, no direct, secondary, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
Coeur d'Alene salamander *(Plethodon idahoensis)* Habitat: Waterfall spray zones, talus near cascading streams	[**N**] No moist talus or streamside talus habitat occurs in the Project Area. Thus, no direct, secondary, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
Columbian sharp-tailed grouse *(Tympanuchus Phasianellus columbianus)* Habitat: Grassland, shrubland, riparian, agriculture	[**N**] No suitable grassland communities occur in the Project Area. Thus, no direct, secondary, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
Common loon *(Gavia immer)* Habitat: Cold mountain lakes, nest in emergent vegetation	[**N**] No suitable lake habitat occurs within 500 feet of the Project Area. Thus, no direct, secondary, or cumulative effects to common loons would be expected to occur as a result of either alternative.
Fisher *(Martes pennanti)* Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	[**Y**] **Detailed Analysis Provided Below** – Approximately 419 acres of suitable fisher habitat occur within the Project Area.
Flammulated owl *(Otus flammeolus)* Habitat: Late-successional ponderosa pine and Douglas-fir forest	[**Y**] **Detailed Analysis Provided Below –** Approximately 314 acres of flammulated owl habitat types occur in the Project Area.
Gray Wolf	[**N**] Wolves may use habitat in the vicinity of the Project Area.

Species/Habitat	[Y/N] Potential Impacts and Mitigation Measures N = Not Present or No Impact is Likely to Occur Y = Impacts May Occur (Explain Below)
(Canis lupus) Habitat: Ample big game populations, security from human activities	Disturbance associated with timber sales at den and rendezvous locations can adversely affect wolves; however, timing restrictions would apply if den or rendezvous sites are documented (*ARM 33.11.430(1)(a)(b)*). Thus, negligible adverse direct, secondary, or cumulative effects to wolves would be anticipated as a result of the Action Alternative. No direct, secondary, or cumulative effects would be anticipated as a result of the No Action Alternative.
Harlequin duck *(Histrionicus histrionicus)* Habitat: White-water streams, boulder and cobble substrates	[**N**] No suitable stream habitat occurs in the vicinity of the Project Area and harlequin ducks have not been observed in the area (*MNHP data, December 15, 2016*). Thus, no direct, secondary, or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
Northern bog lemming *(Synaptomys borealis)* Habitat: Sphagnum meadows, bogs, fens with thick moss mats	[**N**] No suitable wetlands occur within the Project Area. Thus, no direct, secondary, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
Northern goshawk (*Accipiter gentilis*) Habitat: Mature stands with open understory for nesting	[**Y**] Adult goshawks were observed in the Project Area in the summer of 2014 and a nest was identified. Within a 40-acre area surrounding the nest, 90 ft^2 of basal area would be retained, which is within the range of conditions at nest sites observed in Oregon and Washington (*McGrath et al. 2003*). The nest tree and all trees within 50 feet of the nest tree would be retained. Motorized activities would be restricted from April 1-August 15 within ¼ mile of the nest with limited hauling permitted in July and August. Occupancy status and nest location would be surveyed in the spring and summer to ensure that the correct area is protected with timing restrictions. Thus, considering that goshawks are forest generalists with specific nest stand requirements (*Squires and Reynolds 1997*), that basal area retention in the vicinity of the nest would be within the range of conditions observed in active goshawk territories, and that timing restrictions would be implemented to reduce potential for disturbance, minor adverse direct, secondary, or cumulative effects to northern goshawks would be anticipated as a result of the Action Alternative. No direct, secondary, or cumulative effects would be anticipated as a result of the No Action Alternative.
Peregrine falcon *(Falco peregrinus)* Habitat: Cliff features near open foraging areas and/or wetlands	[**N**] Large cliffs and rock outcrops were observed in the vicinity of Section 36 of the Project Area; however, peregrine eyries have not been documented in the vicinity of the Project Area (*MNHP data, December 15, 2016*). Timing restrictions would be instated if an eyrie is discovered. Thus, no direct, secondary, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
Pileated woodpecker *(Dryocopus pileatus)* Habitat: Late-successional ponderosa pine and larch-fir forest	[**Y**] **Detailed Analysis Provided Below –** Approximately 537 acres of pileated woodpecker habitat occur in the Project Area.
Townsend's big-eared bat *(Plecotus townsendii)* Habitat: Caves, caverns, old mines	[**N**] No suitable caves or mine tunnels are known to occur in the Project Area. Thus, no direct, secondary or cumulative effects to Townsend's big-eared bats would be expected to occur as a result of either alternative.

Species/Habitat	[Y/N] Potential Impacts and Mitigation Measures N = Not Present or No Impact is Likely to Occur Y = Impacts May Occur (Explain Below)
Wolverine *(Gulo gulo)* Habitat: Alpine tundra and high-elevation boreal forests that maintain deep persistent snow into late spring	[**N**] No high-elevation habitat with persistent spring snowpack occurs in the Project Area. Wolverine sightings have not been reported in the vicinity of the Project Area; however, wolverines may travel through the area at any time (*MNHP data, December 15, 2016*). Thus, no adverse direct, secondary or cumulative adverse effects to wolverines would be anticipated as a result of either alternative.
Big Game Species	
Elk	[**N**] The Project Area is located outside of areas identified as big game winter range by DFWP (*2008*). Thus, no adverse direct, secondary or cumulative adverse effects to big game species would be anticipated as a result of either alternative.
Whitetail	
Mule Deer	

Threatened and Endangered Species

CANADA LYNX

Issue
The proposed activities could reduce landscape connectivity and the availability of suitable Canada lynx habitat, reducing the capacity of the area to support Canada lynx.

Introduction
Canada lynx are medium-size cats that prey primarily on snowshoe hares, and they are federally listed as a threatened species (*Ruediger et al. 2000*). Lynx foraging habitat in western Montana consists of a mosaic of young coniferous stands and mature forested stands with high levels of canopy cover, which provide snowshoe hare habitat (*Squires et al. 2010, Squires et al. 2013*). Retaining habitat connectivity of both summer and winter lynx foraging habitat is important since winter corridors may provide local connectivity while summer corridors are more likely to facilitate long-distance dispersal (*Squires et al. 2013*). Forest management considerations for lynx include providing a mosaic of well-connected young and mature lynx habitat patches containing high horizontal cover.

Analysis Area
The analysis area for direct and secondary effects is the Project Area and the analysis area for cumulative effects is the 27,682-acre Large CEAA as described in *TABLE WI-1* and depicted in *FIGURE WI-1.* The Large CEAA approximates the size of a lynx home range, is centered on the Project Area, and is defined according to geographic features (i.e., ridgelines), which are likely to influence movements of Canada lynx in the vicinity of the Project Area providing a reasonable analysis area for Canada lynx that could be influenced by project-related activities.

Measurement Criteria
Factors considered in the analysis include: 1) the level of harvesting, 2) the availability of suitable lynx habitat classes, and 3) landscape connectivity. Suitable lynx habitat was subdivided into the following lynx habitat classes: 1) winter foraging, 2) summer foraging, 3) other suitable, and 4) temporary non-habitat. All habitat classes were identified according to DNRC's lynx habitat mapping protocols (*USFWS and DNRC 2010*). Other suitable lynx habitat is defined as habitat that has the potential to provide connectivity and lower quality foraging habitat, but does not contain the necessary attributes to be classified as winter or summer foraging habitat classes. The temporary non-habitat category consists of forested stands that are not expected to be used by lynx until suitable horizontal cover develops. On non-DNRC lands, stands with ≥40% canopy cover provided by trees >9 inches dbh on average were considered to provide potential lynx habitat.

Existing Environment
The Project Area contains suitable lynx habitat in Section 36 (*TABLE WI-5*). Section 4 of the Project Area does not contain suitable habitat. Stands that do not provide potential habitat in the Project Area consist of 314 acres of dry ponderosa pine and Douglas-fir stands that are not preferred lynx cover types. Suitable lynx habitat is continuous across the Project Area and is located on cool north-facing slopes and along the bottom of the Pleasant Valley Fisher River, which has the potential to act as a travel corridor.

The Large CEAA contains suitable lynx habitat (*TABLE WI-5*), with the majority of potential lynx habitat located west of the Pleasant Valley Fisher River or in the Barnum Creek drainage. The remaining portions of the CEAA consist primarily of young recently harvested stands that may not have adequate stem densities for lynx use. In the vicinity of the Project Area and on surrounding lands, connectivity of lynx habitats is low, with limited narrow corridors located along streams between habitat patches.

Table WI-5– Estimated acreage of lynx habitat that would remain in the Project Area and Large CEAA post-harvest. Values in parentheses refer to the percentage of the total potential lynx habitat[a] that each lynx habitat class represents.

Lynx Habitat Category	Project Area		Large CEAA	
	Existing	Post-Harvest	Existing	Post-Harvest
Other Suitable (DNRC)	84 (20.6%)	0 (0%)	331 (4.6%)	247 (3.4%)
Summer Foraging (DNRC)	45 (11.0%)	45 (11.0%)	286 (4.0%)	286 (4.0%)
Winter Foraging (DNRC)	279 (68.4%)	161 (39.5%)	626 (8.7%)	508 (7.1%)
Temporary Non-habitat (DNRC)	0 (0%)	201 (49.3%)	8 (0.1%)	209 (2.9%)
Additional Potential Habitat – non-DNRC Ownership	0 (0%)	0 (0%)	5,936 (82.6%)	5,936 (82.6%)
Grand Total - Suitable Lynx Habitat[b] (All Ownerships)	408 (100.0%)	207 (50.5%)	7,187 (100.0%)	6,986 (97.2%)

[a]Total potential lynx habitat describes all areas that contain appropriate habitat types for lynx (i.e., sum of summer forage, winter forage, other suitable, and temporary non-suitable lynx habitat classes).
[b]Total suitable lynx habitat describes all lynx habitat categories that contain structural attributes necessary for lynx use (i.e., sum of summer forage, winter forage, other suitable lynx habitat classes, potential habitat on non-DNRC lands).

Environmental Effects
No Action Alternative: Direct, Secondary, and Cumulative Effects on Canada Lynx
None of the proposed forest management activities would occur on DNRC lands. In the short-term, lynx habitat availability and connectivity would not change. In the long-term and in the absence of natural disturbance, winter foraging habitat availability would increase due to natural forest succession while summer foraging habitat availability would decrease due to the lack of young regenerating stands. Connectivity may also increase in the long-term due to increasing canopy cover over time.

Action Alternative: Direct and Secondary Effects on Canada Lynx
The proposed activities would affect 201 acres (49.3%) of the 408 acres of potentially suitable lynx habitat available in the Project Area. After harvest, these acres would be temporarily unsuitable for lynx use due to lack of canopy cover in the understory and overstory (*TABLE WI-5*). These may be suitable for lynx use again in 10-15 years after young trees have grown to a sufficient height. To ensure that forest structural attributes preferred by snowshoe hares remain following harvest, dense patches of advanced regeneration would be

retained in lynx winter forage habitat. Additionally, 15 to 20 tons/acre of coarse woody debris would be retained in accordance with DNRC Forest Management Rules (*ARM 36.11.414)* and retention of downed logs ≥15 inch diameter would be emphasized. Lynx habitat connectivity would be reduced; however, overall, suitable lynx habitat would remain continuous due to the retention of a 300-foot wide corridor along the Pleasant Valley Fisher River and an unnamed tributary in Section 36. If present in the vicinity of the Project Area, lynx could be temporarily displaced by forest management activities for approximately 3 years due to disturbance caused by motorized activities. Thus, since: 1) lynx suitable habitat availability would be reduced by 201 acres (49.3%) of existing habitat in the Project Area); 2) patches of shade-tolerant trees would be retained where feasible in winter foraging habitat; and 3) landscape connectivity would be reduced but corridors would remain; moderate adverse direct and secondary effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the Action Alternative.

Action Alternative: Cumulative Effects on Canada Lynx
The proposed activities would affect 201 acres (2.8%) of the 7,187 acres of suitable lynx habitat available in the Large CEAA. These acres would be temporarily unsuitable for lynx use due to lack of canopy cover in the understory and overstory. Patches of shade tolerant trees and approximately 15 to 20 tons/acre of coarse woody debris would be retained emphasizing retention of downed logs ≥15 inch diameter to provide important lynx and snowshoe hare habitat components. Lynx habitat connectivity would be slightly reduced; but 300-foot wide corridors along the Pleasant Valley Fisher River and an unnamed tributary in Section 36 would be retained. Overall, connectivity of potential lynx habitat in the vicinity of the Project Area would remain low due to the low availability of potential habitat on surrounding lands. Changes to lynx habitat availability and connectivity would be additive to past, proposed, and ongoing project (see *TABLE WI-2*). Lynx could be temporarily displaced by forest management activities associated with the Meadow Ridge Timber Sale and other ongoing activities for approximately 3 years. Thus, since: 1) lynx suitable habitat availability would be reduced by 201 acres (2.8% of potentially suitable lynx habitat in the Large CEAA); 2) patches of advanced regeneration and shade-tolerant understory trees would be retained where feasible; and 3) landscape connectivity would be slightly reduced, but would overall impacts would be minimal considering little suitable habitat borders the Project Area; minor adverse cumulative effects to Canada lynx associated with landscape connectivity and suitable habitat type availability would be anticipated as a result of the Action Alternative.

Sensitive Species
FISHERS

Issue
The proposed activities could reduce the availability and connectivity of suitable fisher habitat and increase human access, which could reduce fisher habitat suitability and increase trapping mortality

Introduction
In the Rocky Mountains, fishers prefer mesic late-successional forests with complex vertical and horizontal structure, large-diameter trees, and relatively dense canopies (*Raley et al. 2012, Schwartz et al. 2013*). Fishers generally avoid large openings, clearcuts, and ponderosa pine and lodgepole pine stands (*Schwartz et al. 2013*). Fishers prey upon snowshoe hares, ungulate carrion, porcupines, birds, and small mammals as well as seasonally available fruits and berries. Fisher resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest-management considerations for fishers involve providing upland and riparian resting and denning habitat, maintaining a network of travel corridors, and reducing trapping risk associated with motorized access.

Analysis Area
The analysis area for direct and secondary effects is the Project Area and the analysis area for cumulative effects is the 27,682-acre Large CEAA as described in *TABLE WI-I* and depicted in *FIGURE WI-1*. The Large CEAA is centered on the Project Area and is defined according to geographic features and could support the

home range of at least one male fisher and multiple female fishers, providing a reasonable analysis area for fishers that could be influenced by project-related activities (*Olson et al. 2014*).

Measurement Criteria
Factors considered in the analysis include: 1) the degree of harvesting, 2) availability and structure of preferred fisher habitats (upland, riparian), and 3) landscape connectivity. Fisher habitat classifications considered in the analysis include: 1) upland fisher habitat, and 2) riparian fisher habitat, which are defined according to proximity of the forest stand to streams. Riparian fisher habitat is located within 100 feet of Class 1 streams or within 50 feet of Class 2 streams (*ARM 36.11.440(b)*). The remaining fisher habitat is considered upland fisher habitat. Habitat structure considered appropriate for fisher use includes stands with 40-100% total stocking density. Potential fisher habitat (riparian, upland) on other ownerships was identified by identifying mature forested habitat (≥40% cover, trees >9 inches dbh average) below 6,000 feet elevation and proximity to perennial and intermittent streams.

Existing Environment
Fisher habitat is present in the Project Area and Large CEAA (*TABLE WI-6*). In the Project Area, suitable moist stands of Douglas-fir and larch are located on cool north facing slopes and are interspersed with dry ponderosa pine and Douglas-fir stands that do not provide suitable structure for fisher use. Habitat is continuous in Section 4 and habitat patches are discontinuous in Section 36 with the majority of fisher habitat located in the southeast portion of the section.

In the Large CEAA, potential fisher habitat is located on cooler slopes in the western portion of the CEAA as well as the Barnum Creek drainage where there is a higher proportion of USFS lands. The eastern portion of the CEAA consists primarily of young, recently harvested timber stands that would not provide suitable habitat for fishers.

Table WI-6 –Fisher Habitat in the Project Area and Large CEAA and anticipated effects of the Meadow Ridge Timber Sale, including potential habitat on non-DNRC ownership. Values in parentheses refer to the percentage that each fisher habitat type represents within the larger analysis area.

Fisher Habitat Attribute	Project Area		Large CEAA	
	Existing	Post-Harvest	Existing	Post-Harvest
Fisher Habitat[a]	419 (58.0%)	242 (33.5%)	6,710 (24.2%)	6,533 (23.6%)
Fisher Riparian Habitat	34 (4.7%)	34 (4.6%)	605 (2.2%)	605 (2.2%)
Fisher Habitat Harvest (% of available habitat)	257 (61.3%)		257 (3.8%)	

[a] Includes potential habitat available on other ownerships.

Environmental Effects
No Action Alternative: Direct, Secondary, and Cumulative Effects on Fishers
None of the proposed forest management activities would occur on DNRC lands. The level of motorized access would not change and no additional risk associated with trapping would be expected. In the short term, no changes to fisher habitat availability or connectivity would occur in the Project Area. In the long-term and in the absence of natural disturbance, fisher habitat suitability and connectivity may increase as stands age, the availability of large-diameter trees increases, and mature canopy cover increases.

Action Alternative: Direct and Secondary Effects on Fishers
The proposed activities would affect fisher habitat (*TABLE WI-6*). Approximately 177 acres of fisher habitat would be treated with a seed tree treatment and would not provide suitable fisher habitat post-harvest due to low retention of mature trees. An additional 80 acres of fisher habitat would be treated with old-growth

maintenance and restoration treatments and these stands would continue providing suitable fisher habitat, albeit at a reduced stand density. Approximately 3 acres of fisher riparian habitat would be harvested in Section 4, but these acres would remain suitable for fisher use post-harvest. The availability of some important habitat characteristics (i.e., snags, coarse woody debris) could be reduced by harvest activities; although retention of dead material and live snag recruitment trees would meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*). Approximately 0.2 miles of road that would be closed to public use are proposed for construction, thus trapping risk associated with human access would increase slightly in Section 4. However, all of the open roads in Section 36 would be closed to public access so trapping risk would be reduced in that area. Connectivity of mature forested habitat suitable for fisher use would decrease under the Action Alternative, although habitat would remain continuous in Section 4 and a travel corridor would be retained in Section 36. If present in the vicinity of the Project Area, fishers could be temporarily displaced by forest management activities approximately 3 years. Thus, since: 1) habitat availability would be reduced by 177 acres (42.2%), but some snags and coarse woody debris would be retained; 2) Stand density would be reduced in an additional 80 acres (19.0%) of fisher habitat; 3) approximately 3 acres of riparian fisher habitat would be harvested, but these acres would remain suitable; 4) landscape connectivity would be reduced, but connectivity corridors would be retained; and 5) 0.2 miles of new restricted roads would be constructed, but overall trapping risk would be reduced considering that all roads in Section 36 would be closed to public use; moderate adverse direct and secondary effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the Action Alternative.

Action Alternative: Cumulative Effects on Fishers

Fisher habitat would be affected by the proposed activities (*TABLE WI-6*). Approximately 177 acres would not be suitable for fisher use post-harvest due to low tree retention and 80 acres would continue providing fisher habitat at a reduced stand density. The availability of some important habitat characteristics (i.e., snags, coarse woody debris) could be reduced by harvest activities; although retention of some dead material and live snag recruitment trees would be required to meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*). There is limited mature forested habitat in the vicinity of the Project Area and connectivity to existing potential habitat patches would be retained post-harvest. Corridors would be retained along the Pleasant Valley Fisher River and the unnamed tributary in Section 36. Approximately 0.3 miles of new roads including 0.1 miles of open road would be constructed, but overall trapping risk would decrease considering that all currently open roads in Section 36 would be closed to public access. Any adverse effects to fisher would be additive to any proposed or ongoing sales in the Large CEAA, although DNRC is unaware of any such projects at this time. Fisher displacement associated with the proposed Meadow Ridge Sale and any other activities in the CEAA could occur for up to 3 years. Thus, since: 1) habitat availability would decrease by 177 acres (2.6% of available potential habitat), but snags and coarse woody debris would be retained (*ARM 36.11.411, ARM 26.11.414*); 2) an additional 80 acres (1.2%) would be harvested, but would remain suitable for fisher use post-harvest; 3) 3 acres of riparian harvest would occur, but these acres would continue providing suitable fisher habitat; 4) landscape connectivity would be reduced, but a travel corridor would be retained in Section 36 and habitat would remain continuous in Section 4; and 5) 0.3 miles of new roads including 0.1 miles of open road would be constructed, but overall trapping risk would be reduced considering that all roads in Section 36 would be closed to public use; minor adverse cumulative effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the Action Alternative.

FLAMMULATED OWL

Issue

The proposed activities could alter the structure of flammulated owl preferred habitat, which could reduce habitat suitability for flammulated owls.

Introduction

Flammulated owls are small, migratory, insectivorous forest owls that inhabit mature, dry stands of ponderosa pine and Douglas-fir with an open physiognomy (*Linkhart and McCallum 2013*). Flammulated owls are

secondary cavity nesters, and in Montana, typically nest in large-diameter ponderosa pine or Douglas-fir cavities excavated by pileated woodpeckers or northern flickers (*Seidensticker et al. 2013*). Forest management considerations for flammulated owls include providing open stands of ponderosa pine and Douglas-fir and retaining large snags for nesting. Timber harvest may affect the structure of timber stands and reduce the availability of snags, potentially reducing habitat suitability for flammulated owls.

Analysis Area
The analysis area for direct and secondary effects is the Project Area and the analysis area for cumulative effects is the 7,464-acre Medium CEAA as described in *TABLE WI-I* and depicted in *FIGURE WI-1*. The Medium CEAA is defined according to ridgelines and creeks, which provides a reasonable analysis area for local flammulated owls that could be affected by project-related activities.

Measurement Criteria
Factors considered in the analysis include: 1) the degree of harvesting, and 2) the structure of flammulated owl preferred habitat. In the Project Area, SLI data were used to identify preferred flammulated owl habitat types (*ARM 36.11.403(28)*). Stands were considered suitable for flammulated owl use if the stocking density of trees >9 inches dbh was in the poorly-stocked class (10-39% canopy cover). On non-DNRC lands, stands containing 10-39% canopy cover that were composed primarily of trees >9 inches dbh below 6,000 feet were considered likely to contain habitat types preferred by flammulated owls as well as matrix habitat.

Existing Environment
The Project Area contains 314 acres (43.4% of Project Area) of cover types preferred by flammulated owls. This habitat is composed primarily of mixed Douglas-fir and ponderosa pine stands with some western larch. Approximately 243 acres of these stands are mature (> 9 inches dbh); however, the stocking density is high in 122 of these acres and these stands are not likely to be used by flammulated owls.

The Medium CEAA contains approximately 1,403 acres (18.8% of Medium CEAA) of mature open forested stands (10-39% canopy cover, 9 inches dbh average). These stands are scattered throughout the CEAA; the majority of the CEAA is managed by Weyerhaeuser and contains a low proportion of mature forested stands. Considering the high road density and accessibility for firewood harvesting, snags availability for nesting may be low.

Environmental Effects
No Action Alternative: Direct, Secondary, and Cumulative Effects on Flammulated Owls
None of the proposed forest management activities would occur on DNRC lands. In the short-term, no change in the availability of flammulated owl habitat would occur. In the long-term and in the absence of natural disturbance, the suitability of flammulated owl habitat may decrease as stand density increases and Douglas-fir continues to grow in the understory.

Action Alternative: Direct and Secondary Effects on Flammulated Owls
Timber harvest would occur in 188 of the 314 acres (60.0%) of preferred flammulated owl cover types available in the Project Area. The proposed activities would open stands to 10-65% canopy cover in these acres, improving stand structure suitability for flammulated owls. Additionally, the proposed harvest would favor leaving ponderosa pine and Douglas-fir while removing shade-tolerant trees, which is preferable for flammulated owls (*ARM 36.11.437(b)*). Some snags could be removed by the proposed harvest, but at least 2 large snag and 2 large snag recruitment tree per acre (>21 inches dbh) would be retained (*ARM 36.11.411*). Disturbance associated with harvesting could adversely affect flammulated owls for approximately 3 years, should they be present in the Project Area. Thus, since: 1) changes in stand structure and cover type would generally increase flammulated owl habitat suitability, and 2) snags would be retained to meet DNRC administrative rules (*ARM 36.11.411*), minor beneficial direct and secondary effects to flammulated owl habitat suitability would be anticipated as a result of the Action Alternative.

Action Alternative: Cumulative Effects on Flammulated Owls
The proposed activities would occur in 188 acres (13.4%) of the 1,403 acres of potential flammulated owl habitat in the Medium CEAA. The proposed activities would open stands to 10-65% canopy cover, favor retention of ponderosa pine and Douglas-fir, and retain patches of regenerating conifers, improving stand structure suitability for flammulated owls (*ARM 36.11.437(b)*). Changes in flammulated owl habitat suitability would be additive to proposed and ongoing activities occurring in the Medium CEAA, although DNRC is currently unaware of such projects. The Action Alternative could disturb flammulated owls for up to 3 years should they be present in the vicinity of the Project Area. Thus, since 1) changes in structure and cover type would generally increase flammulated owl habitat suitability, and 2) snags would be retained to meet DNRC administrative rules (*ARM 36.11.411*), minor beneficial cumulative effects to flammulated owl habitat suitability would be anticipated as a result of the Action Alternative.

PILEATED WOODPECKERS

Issue
The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for pileated woodpeckers.

Introduction
Pileated woodpeckers play an important role in mature forests by excavating large cavities that are often used in subsequent years by a variety of wildlife species for nesting and roosting. Pileated woodpeckers require mature forest stands with large-diameter (≥20 inch dbh) dead or defective trees for nesting and foraging and the density of pileated woodpeckers is positively correlated with the amount of dead and dying wood in a stand (*McClelland 1979*). Timber harvest may remove large-diameter trees necessary for nesting and fragmentation can make birds more vulnerable to predation as they travel between habitat patches (*Bull and Jackson 2011*). Forest management considerations for pileated woodpeckers include retaining dense patches of old and mature coniferous forest with abundant large snags and coarse-woody debris for foraging, roosting, and nesting.

Analysis Area
The analysis area for direct and secondary effects is the Project Area and the analysis area for cumulative effects is the 7,464-acre Medium CEAA is defined according to geographic features as described in *TABLE WI-I* and depicted in *FIGURE WI-1*. This scale provides a sufficient area to support multiple pairs of pileated woodpeckers (*Bull and Jackson 2011*).

Measurement Criteria
Factors considered in the analysis include: 1) the degree of harvesting and 2) the structure of pileated woodpecker preferred habitat types. On DNRC-managed lands, sawtimber stands ≥100 years old within preferred pileated cover types (*ARM 36.11.403(58)*) with ≥40% canopy closure were considered potential pileated woodpecker habitat. On non-DNRC lands, mature forest stands (≥40% canopy cover, >9 inches dbh average) below 6,000 feet elevation were considered potential pileated woodpecker habitat.

Existing Environment
The Project Area contains 537 acres (74.4% of Project Area) of suitable pileated woodpecker habitat. This habitat is composed of Douglas-fir, western larch, and some ponderosa pine stands. Pileated woodpeckers were not observed during field visits, but foraging on snags was observed and snag availability is moderate at approximately 5 snags per acre. However, firewood is regularly harvested from the Project Area and snag availability is low adjacent to open roads.

The Medium CEAA contains 1,471 acres (19.7% of Medium CEAA) of potential pileated woodpecker habitat scattered throughout the CEAA including 537 acres on DNRC lands and 934 acres on other ownerships. An additional 1,089 acres of mature stands with <40% canopy cover occur in the CEAA, which may facilitate

connectivity, but would not provide suitable habitat. The remaining stands consist primarily of young stands that were recently harvested and contain low densities of mature trees. Open road density in the Medium CEAA is 3.2 miles/square mile, which provides access for firewood cutting and may reduce snag availability for nesting.

Environmental Effects

No Action Alternative: Direct, Secondary, and Cumulative Effects on Pileated Woodpeckers

None of the proposed forest management activities would occur on DNRC lands. In the short-term, no changes to pileated woodpecker habitat would be anticipated. However, in the long-term, and in the absence of natural disturbance, pileated woodpecker habitat availability and connectivity may increase due to natural succession and aging of timber stands.

Action Alternative: Direct and Secondary Effects on Pileated Woodpeckers

The proposed activities would occur in 319 acres (59.4%) of the 537 acres of pileated woodpecker habitat available in the Project Area. Seed tree treatments proposed for 158 of these acres would open stands to 10-15% canopy cover causing the structure of these stands to become unsuitable for appreciable use by pileated woodpeckers. The remaining acres would be treated with old-growth maintenance and restoration treatments and would remain suitable for pileated woodpecker use post-harvest. Snags would be removed by the proposed harvest, but at least 2 large snags and 2 large snag recruitment trees per acre (>21 inches dbh) would be retained and snags cut for safety reasons would be left in the harvest unit (*ARM 36.11.411*). Disturbance associated with harvesting could adversely affect pileated woodpeckers on portions of the Project Area for approximately 3 years, should they be present in the Project Area. Thus, since: 1) forest structural changes would occur, but mitigation would include retention of snags and coarse woody debris (*ARM 36.11.411, ARM 36.11.414*); and 2) harvesting would reduce pileated woodpecker suitable habitat availability by 158 acres (29.4%); moderate adverse direct and secondary effects to pileated woodpecker habitat suitability in the Project Area would be anticipated as a result of the Action Alternative.

Action Alternative: Cumulative Effects on Pileated Woodpeckers

The proposed activities would occur in 319 acres (21.7%) of the 1,471 acres of potential pileated woodpecker habitat in the Medium CEAA reducing habitat availability. Approximately 158 of these acres would not provide suitable pileated woodpecker use post-harvest while the remaining acres would retain adequate stand structure for the woodpeckers. Snags would be removed by the proposed harvest, but at least 2 large snags and 2 large snag recruitment trees per acre (>21 inches dbh) would be retained (*ARM 36.11.411*). Changes in pileated woodpecker habitat suitability would be additive to proposed and ongoing activities occurring in the Medium CEAA, although DNRC is currently unaware of such projects. Disturbance associated with the proposed activities could adversely affect pileated woodpeckers in the vicinity of the Project Area for up to 3 years. Thus, since: 1) structural changes would occur, but mitigations would include retention of snags and coarse woody debris; and 2) harvesting would reduce pileated woodpecker suitable habitat availability by 158 acres (10.7%) within the Medium CEAA; minor adverse cumulative effects to pileated woodpecker habitat suitability would be anticipated as a result of the Action Alternative.

Wildlife Mitigations

- If a threatened or endangered species is encountered, consult a DNRC biologist immediately. Similarly, if undocumented nesting raptors or wolf dens are encountered within ½ mile of the Project Area contact a DNRC biologist.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per *ARM 36.11.444(2)* and *GB-PR2* (*USFWS and DNRC 2010)*.

- Contractors would adhere to food storage and sanitation requirements as described in the timber sale contract. Ensure that all attractants such as food, garbage, and petroleum products are stored in a bear-resistant manner.
- Restrict public access at all times on restricted roads that are opened for harvesting activities. Effectively close all restricted roads following harvest completion.
- In EA Units 2, 4, and 5 retain patches of advanced regeneration of shade-tolerant trees as per *LY-HB4* (*USFWS and DNRC 2010*).
- To protect nesting northern goshawks, prohibit hauling and logging within ¼ mile of the nest from April 1-June 30. From July 1- August 15, prohibit logging within ¼ mile of the nest and permit log hauling for a restricted time period during the morning. Timing restrictions may be lifted if the territory is unoccupied.
- Retain 90 ft^2 basal area near the goshawk nest and retain all trees within 50 feet of the nest.
- Retain visual screening along roads where possible to increase security for wildlife.
- Retain at least 2 snags and 2 snag recruits per acre that are ≥ 21 inches diameter or the next largest available size class, favoring western larch, ponderosa pine, and Douglas-fir for retention. If snags are cut for safety concerns, they must be left in the harvest unit.
- Retain 15-20 tons/acre of coarse-woody debris. Retain coarse-woody debris according to *ARM 36.11.414* and emphasize retention of 15-inch diameter downed logs aiming for at least one 20 foot long section per acre.

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Figure WI-1 –Wildlife analysis areas and harvest units for the proposed Meadow Ridge Timber Sale.

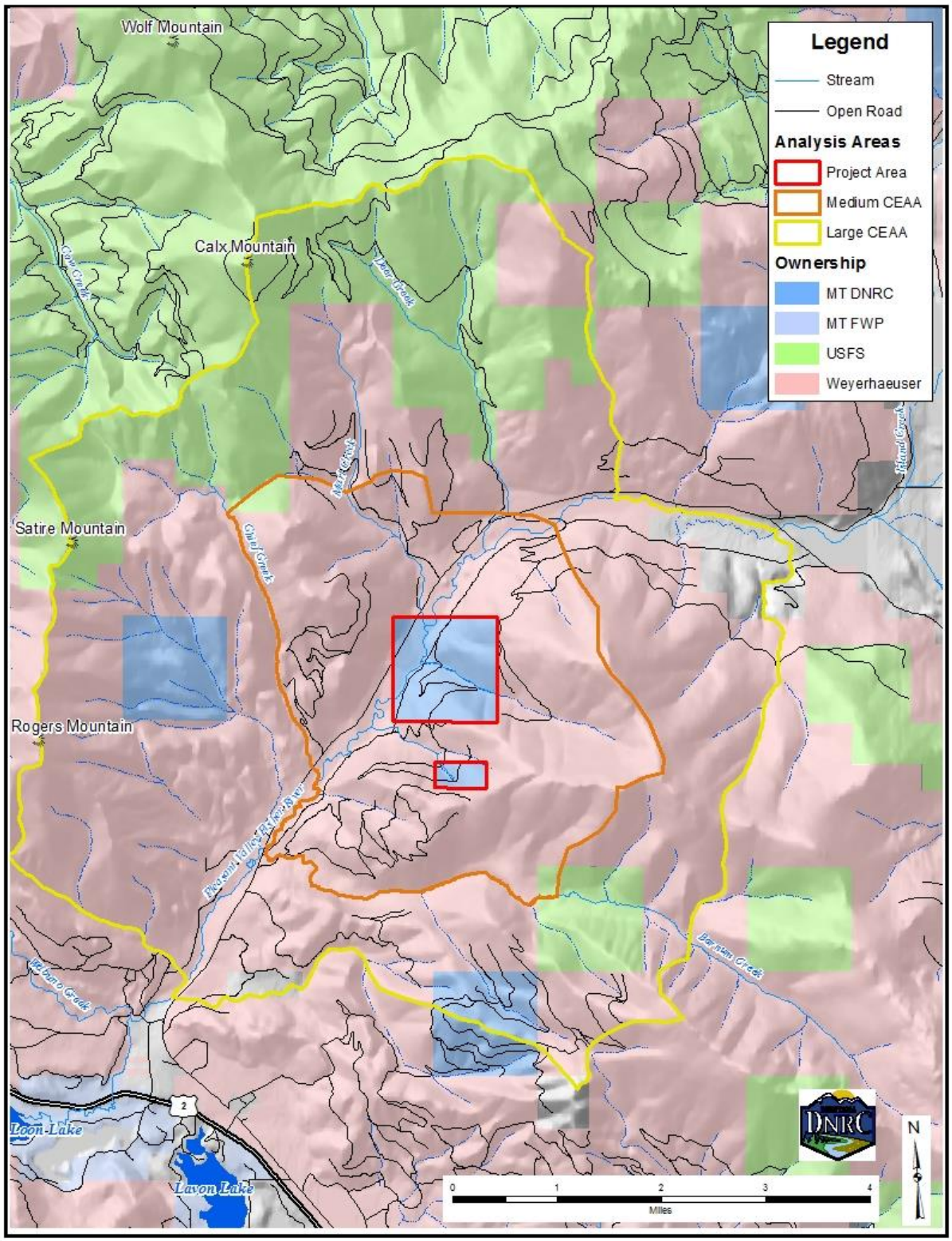

Figure WI-2 –Harvest units, mature canopy cover, old-growth, and potential connectivity areas for the proposed Meadow Ridge Timber Sale.